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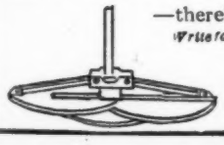

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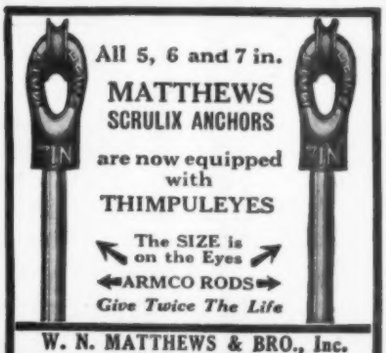

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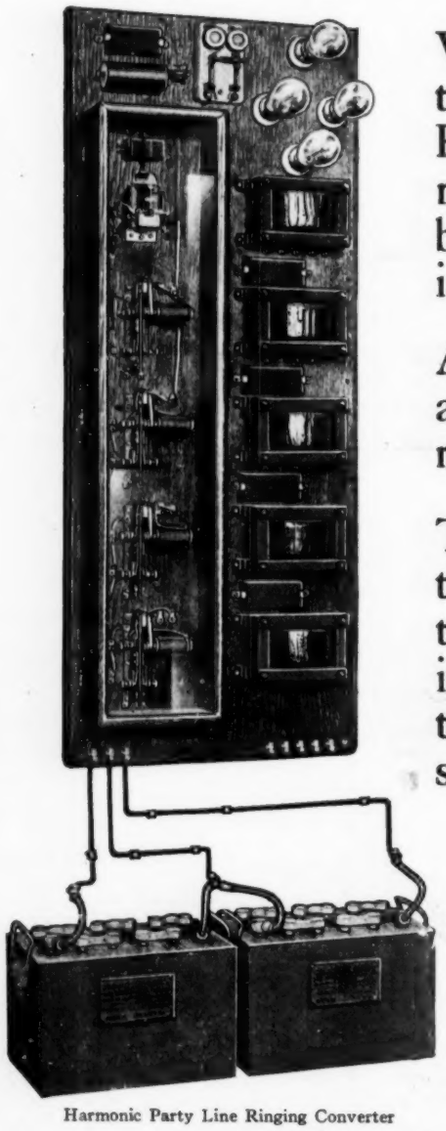

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By the Way—

The New England Bell has announced its intention to install no more telephones until further notice.

The reasons assigned are: Difficulty of obtaining raw materials, high prices, shortage of labor and large military demands.

Meanwhile the Western Electric Co., the Bell purchasing agent, is soliciting Independent business, promising prompt shipments.

This means that Bell licensees, operating in non-competitive territory, deprive the public of service while the Bell factory tries to hamstring Independent manufacturers where competition exists. A fine example of Hohenzollern efficiency!

What of the Future?

"I would rather live in the next ten years than any 25 years that have passed," is the statement accredited to one of America's prominent men. And when we ponder the matter, so would we. It is true that there have been many historical and epoch-making events but indications are that the occurrences of the next ten years will far surpass anything of the past.

Men in all lines of endeavor are seeking to fathom the trend of events as relates to their own business. They have made, and are making, careful studies of every atom of their business, seeking ways in which costs may be cut and a better article produced. They know that the man who has a product well put up and priced to allow a fair profit is the one who will survive. To do this, of course, implies executive ability and good management.

The telephone, although a public utility, faces the same conditions as other industries. It has, however, this advantage—it is not in the class of luxuries but is a real necessity. People who have always had telephone service will cut in other directions before discontinuing it.

Costs of everything are very high now—and it does not appear that there will be any material decreases for some time to come, even were the war to end this fall. Many telephone companies have applied to public utility commissions for increases in rates. In some instances the increases have been granted but in many others the applications have been dismissed because of inadequate records to prove the contention that increases are essential.

The companies which have been refused increases, as well as those that have been granted increases, will necessarily have to watch carefully all the items for which outlays are necessary. This means that slip-shod methods must be eliminated—they cost money. Buying must be watched to obtain the best values for the expenditures. The credits of prospective subscribers must be scrutinized with care. The collections must be forced to even higher marks than has previously been the case. Inspections must be more exact, for "a stitch in time saves nine." Repairs must be permanently made.

Watchfulness of details, celerity of performance and co-operation of all forces are the watchwords of the wide-awake executive of today. Planning and thinking—and yet more thinking—must be done to meet the conditions which may greatly change in the ensuing years.

"Not Knocking Anybody."

The Postal Telegraph-Cable Co. is enclosing in its mail a neat little printed slip which says in type which hits you in the eye:

"The Postal Telegraph-Cable Co. minds its own business. It does not compete with its patrons in the sale of merchandise or in any other way. Its employes are not permitted to act as agents for any other concern."

Now, whom do you think the Postal has in mind? Probably not more than one in a thousand having any information about the telephone or telegraph business will need more than a single guess. For the benefit of that solitary individual we pause an instant, in re-reading Judge Dever's decree in the Central Union case, to state that the Postal refers to the Bell telephone organization which the United States government compelled to disgorge the Western Union Telegraph Co.

Does the Postal suspect that the American Telephone & Telegraph Co. is still "co-operating" with the Western Union?

Some Phases of Plant Management

Discussion of Plant Organization, Importance of System and Proper Plant Accounting, Outstanding Land-Marks Affecting Plant Management—Paper Presented at Western Pennsylvania Independent Telephone Convention

By F. J. Heavens

This is, or should be, a most interesting subject to the persons owning and operating Independent telephone properties, if for no other reasons than that the plant is the one tangible form representing the bulk of the investment and a greater part of the operating expense.

A paper of this nature, to cover the subject thoroughly and in detail, would be so voluminous as to make its presentation impracticable in a meeting of this character. Therefore, the speaker believes it will be more interesting if he dwells for a few moments on what to him are the most important outstanding land-marks, which affect the management of all plants large and small. These land-marks are: "organization," "system," and "plant accounting."

Organization.

The important features of a plant organization are form and personnel. Its form is usually dependent upon the size of the plant and the degree of supervision desired. The simplest method of determining the form required is to prepare a chart showing all the officials and employes in their relative positions.

This chart will visualize the entire scheme and can be studied with greater facility than a similar record shown in some other manner. It can be prepared on tracing cloth and blueprints made from the tracing in any quantity required for distribution and posting. It serves as a guide by which the departmental activities are carried on, and shows the responsibilities and nature of work of each individual.

The members of the organization, regardless of position, should be highly trained men in their respective branches of the work. To obtain these men is frequently most difficult, and the department is, more often than not, put to the necessity of taking likely looking material and training it in the proper way. This training is a larger item of expense than the average company appreciates.

When you stop to think that our business is the fourth largest industry in the country, you wonder why there is such a dearth of really capable plant men. There are few other businesses, which can be handled with such apparent success by a staff of men averaging, relatively, so low in knowledge of the principles and theories involved, as in our business.

It is amazing when you think of the thousands of dollars spent by the plant department with generally less capable supervision than are hundreds by other departments.

One of the answers to this is the "mystery" which surrounds plant. This mystery is acknowledged by practically all telephone men not connected with plant, and even by many of the plant men themselves.

As a result, there are comparatively few persons able to judge as to the capabilities of plant men in general, and

F. J. Heavens.

this makes for a lack of ambition to learn, due to a lack of necessity among those individuals who are content to know only enough about their own work to just "get by," to use a street expression, and constitute unsatisfactory material for promotion. There are, however, a few—and I might say too few—whose desire is to master every branch of the work, and in that manner fit themselves for the better positions.

I know of few technical vocations in which an education can be obtained so easily and inexpensively as telephony. Our correspondence schools, trade paper technical courses and numberless text books already on the book shelves, and others constantly following, put a thorough knowledge of the art within the grasp of the man who wants it.

The cost in money is trivial; in time, comparatively slight and regulated by the student's thoroughness and ability to absorb knowledge; in returns, out of all proportion to the cost and effort. And furthermore, such knowledge and ability gained, constitute a secure and dependable foundation, guaranteeing a successful career in a business which is absolutely indispensable to society in all its phases.

It is not difficult to pick out those who want to learn, and if proper attention and help is given them, your organization will surely profit. Many surprises are in store for you, if you will but look into the capabilities of, and knowledge possessed by your plant men of their work.

Then turn the light on yourself and try to answer the question of "How does it operate and why?" Dispel the mystery and it resolves itself into a few principles applied in simple manner.

To quote an old adage, "Plan your work, then work your plan," but be careful to see that those who work the plan, know how.

Importance of System.

Without system, all is chaos. There are systems and then more systems. Some fit, some don't; but as there is a cure for every ill, so there is a system to suit the needs of every organization.

To formulate a system covering all the details of plant work and routine is not a difficult task, having at hand all the necessary information in regard to local conditions, from of organizations and the requirements of other departments in those instances where there is contact through reports and records.

The greatest difficulty is in keeping the system on the track and running smoothly. If it doesn't work, there is either something wrong with the system or with the individuals running it. If the fault lies with the system, it is a comparatively simple matter to diagnose its complaint and supply the remedy; if with the human element, it is likewise a simple matter to locate the seat of the difficulty, but a different matter, in most cases, to easily remedy it.

The complexity of our business requires the systematic and methodical handling of every detail of the work and affects every individual. In turn, the failure of the individual frequently upsets the entire system and its effects are sometimes evident even in other departments.

In order to preserve the system, the individual must be made to appreciate the real reason for the so-called "red tape" and the importance of his own work in the general scheme. Many an instance of what appears to be deliberate violation of the system, when investigated, brings to light an individual who has never been properly instructed in the whys and wherefores of doing a thing one way and not another, which, in his mind, might be just as good and serve the same purpose.

Operating a Good System.

Every employe should be fully instructed in the details of, not only that portion of the system affected by his efforts, but, the system in its entirety, in order that he may better understand its importance and appreciate the fact that while he may be laboring in some obscure corner doing relatively unimportant work, his degree of competency is frequently reflected through his manner of following the system as laid down. It is surprising how quickly a good system behaving badly will respond to this treatment.

There is just a thought here that might be well to ponder. It is the increased personal interest and pride in the department so frequently resulting when the entire scheme is clearly and carefully explained to every person involved.

The best system is the one with which the desired result is obtained, involving the fewest moves in the simplest manner. We must ever be careful that our zeal does not result in the developing of a system so complicated and unwieldy as to defeat its own purpose.

No matter how small or how large the plant, we must have system and its institution is essential to the higher efficiency for which all of us are striving.

Plant Accounting.

Our organization has been completed, and its activities are being regulated by the thing we call "system." We have carefully studied the organization chart and checked up the system to make sure it is working smoothly and economically. To all appearances no advantageous re-arrangements can be made. We think we are nearly perfect as possible. But, are we?

The way to find out is through a system of plant accounting. Ordinarily, the general accounting department of the company received daily, weekly, semi-monthly and monthly, as the case may be, records of expenditures made or authorized by the plant for labor, material, team hire, motor vehicles, rights-of-way, permits, petty expenses and numerous other items.

The auditor checks these items for authorization and mechanical accuracy, combining into one amount all items chargeable to the same account. At the end of the month he prepares a financial statement showing the condition of the company's affairs, which, of course, includes all the plant expenditures distributed among the different accounts.

In order to properly analyze these accounts, reference must be made to the original records which are in the form of time sheets, bills, invoices, petty expense vouchers, etc., and, generally, are not filed together. To pick from these records all of the items composing the accounts under scrutiny, is a more or less intricate task.

Under these circumstances, there is very apt to be less supervision over the plant expenditures than would be the case if the detail of the plant accounts were compiled in a manner admitting of ease in making comparisons from month to month. Also, in those instances where the auditor's statement shows variations in certain accounts, the reasons for such variations must be explained and if no running record of the detail is kept, the explanations may be more or less inaccurate. To keep a record of this character is more simple than might be supposed.

Report Forms.

It is only necessary to divide the expenditures into classes, such as pay roll, materials used, petty expenses, etc., which are usually the forms they are in when transmitted to the accounting department. A sheet for each class is prepared, of sufficient size to accomodate an entire year. The account designations appear in a column at the extreme left, divided into groups such as capital accounts, maintenance accounts, estimate accounts, special accounts chargeable to other companies, etc. Along the top of the sheets will appear the months with a column between each, in which to note increases or decreases.

For instance, let us consider payroll. Each month enter opposite the proper accounts on the payroll sheet the total of each account as shown on the payroll distribution, and in the next column to the right, in black or red, show the increases or decreases as compared with the previous month.

After these entries have been made, total each group of accounts, showing net increases or decreases and tabulate on a similar sheet by substituting the group designations for the account designations. As there will be but few groups as compared with accounts, this sheet can be much smaller, or, instead of using a separate sheet, the record by groups can be kept on the lower portion of the account detail sheet.

Another record can easily be kept by taking the total of each sub-department payroll, such as construction, maintenance, cable and installation, tabulating in the same manner as was done with the groups. These statements will balance.

The materials used, petty expense, team hire, motor vehicle expense and other classes of expenditure can be treated similarly to payrolls, showing the separate accounts, groupings by account classifications and department sub-division.

Overtime can be treated likewise. In the large companies especially, this item frequently runs into hundreds of dollars a month, and the subject is well worth investigation. After this is done, curves can be platted on cross-section paper in accordance with the totals shown. These graphical representations are most interesting.

A glance at these statements and charts will serve to acquaint you with the channels into which the plant expenditures have gone, and to what extent compared with previous months. It puts you at once into possession of facts which otherwise you might not learn until the auditor's monthly statement is available, which may be several weeks after the close of the month. You are able to detect conditions requiring correction, extravagances or trends in that direction, which, if these records were not kept, might not be noticed for a long time, if at all.

A study of these records will give far more real insight into the department activities than the average general financial statement, and they are for the most part compiled from totals which must be determined in any event.

Plant accounting is just as large a part of the foundation of efficiency as organization and system, but the co-ordination of all three is vitally necessary to successful plant management.

Directing Stage Lighting by Telephone in Producing Movies.

The great motion pictures of the day are practically all directed by means of the telephone, but the telephone is used not only for directing motion picture scenes, but also as a modern aid in securing desired lighting effects in connection with the staging of scenes in a theater catering to legitimate drama.

An expert in lighting effects equipped with an operator's set, occupies a seat in the audience and transmits instructions to the stage electrician also equipped with an operator's set, who is stationed at the electric light switchboard, which is located on one side of the stage.

By using the telephone, the most perfect lighting arrangements can be obtained and proper adjustments made at the instant under expert direction without the noise of bells, buzzers or other signals, as the telephone line is in constant use throughout the performance.

The stage electrician is so located that it is impossible for him to see the lighting effect as it is seen by the audience. The telephone has again solved a problem and has accomplished the desired results with success.

The Transposed Telephone Pair

Transpositions to Minimize the Effects of Cross Talk Induction or Other Electrical Disturbances—Theory of Disturbing Potentials and Explanation of Transpositions—Systems of Transpositions and How They Are Built Up

By Jesse M. Grigg

By the transposed pair is meant any portion of an electrical circuit of which the two sides are systematically interchanged for the purpose of minimizing the effects of cross-talk, induction, or

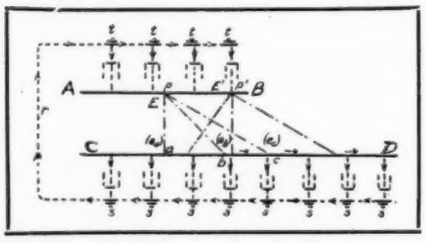


Fig. 1. Illustration of Electrostatic Potential Field.

any other electrical disturbance arising from the ever-present causes. Obviously, this definition of the subject must include any transposed pair, whether it be an open-wire line, the twisted pairs in a telephone cable, house drops, or the ordinary wiring duplex, though in the case of twisted pair the twisting serves a mechanical in addition to an electrical purpose.

Before dealing with the telephone circuit proper, it is necessary to make some preliminary explanations. In Fig 1 are represented two wires, *AB* and *CD*, *AB* being charged to a potential *E*. In every direction about the wire, *AB*, there exists a field of electrostatic potential which diminishes in intensity with the distance receded from the wire. Now consider the potential at a mere point *p*, for the moment neglecting the potential existing in every other point of the wire.

Due to this potential at *p*, there will exist at *a* an induced potential E_a, at *b* a potential E_b, and so on for every other point in the wire, *CD*. Also, since the distance, *pb*, is greater than the distance, *pa*, the induced potential at *b* is less than it is at *a*; and for the same reason less at *c* than at *b*.

If any other point in the wire, *AB*, be considered, for instance *p'*, it must also be said that due to it potentials as before will be induced in *CD*, at every point diminishing in intensity according to the distance from the point *p'*. Considering the combined effect of all the points in *AB*, the total potential induced in *CD* will be the sum of all the infinitesimal potentials induced in the manner explained. This total is inversely proportional to the capacity between the two wires.

Because of the potentials set up along the wire, *CD*, currents will flow in the wire and find escape to ground through the static capacity of the air. This static capacity to earth exists at every point in the wires. In Fig. 1 it is represented with imaginary condensers connecting *AB* and *CD* to earth. The path of the induced currents for a positive charge is through the earth from points, *s* to *t*, and thence to the charging wire, *AB*.

Another way to picture the necessity of currents along the wire, *CD*, and through the return paths designated, is to imagine that the earth under the condensers at points, *s*, is at the same potential as it is at the points, *t*. Then, since the potentials in *AB* are relatively different than the potentials in *CD*, the potential gradient from *CD* to earth will normally be the same as from *AB* to earth. Hence, because of the existing inequality, currents must flow in the designated paths.

Of the foregoing, the important things to bear in mind are these: That the static potentials set up decrease with the distance receded from the disturbing element; and that, because of these induced potentials, currents will flow along the wire itself, and to the earth through the static capacity of the air.

Now, instead of a single conductor, let *CD* be a loop as represented in Fig. 2. Potentials and currents will be induced as before, existing now in two wires instead of one, but the currents flowing in the wire nearest to *AB* will exceed those in the wire farthest from it. Because of this inequality of current, a receiver bridged across the line at some point, say *x*, will have current diverted through it, causing noise in the receiver. This current will flow from the higher to the lower potential, trying to equalize the current balance at the point where the receiver is applied.

It may be said, then, that in a non-transposed loop, interference results from this reason: Due to unequal spacing of the two wires from the disturbing source of potential, the currents which are bound to flow in the two sides of the line are unequal in value; and because of this inequality, adjacent points in the line are unlike in potential. It follows, therefore, that any shunt bridged across adjacent points will deflect current. Thus, with a telephone receiver bridged across such a circuit, may be detected any electrical disturbance arising, from cross talk to the splutter of a lightning flash. It should be noted here that in the transposed circuit, even, these induced currents do not disappear. They are merely equalized, and thus balanced one against the other.

In Fig. 3 is represented a transposed telephone circuit, for convenience of explanation shown with only six sections To avoid confusion, the two sides, *C* and *D*, and their accompanying capacities to earth are drawn in dotted and full lines respectively. Here only one condenser is shown per section-length of conductor, but in actuality the capacity is distributed over the whole length of the circuit.

In passing, it may also be noted that an infinite number of imaginary condensers connect the conductors to each other, but, since these are unnecessary in the explanation, they are not represented in the sketch. Only the capacities to earth are shown, and the total capacity of a section is represented by a single condenser per wire, omitting the fact that it is fairly uniform in its distribution.

AB represents the disturbing element, chosen at random as regards length, distance, direction, etc. It may be an alternating-current transmission line, another telephone circuit, a telegraph line, a wireless station, or a disturbing force in the nature of a lightning storm or other static disturbance.

As in the case of the non-transposed loop, Fig. 2, potentials and currents are induced in the two sides of this circuit. But now, since the transposing spaces the two sides at the same average distance from the source of disturbance, the po-

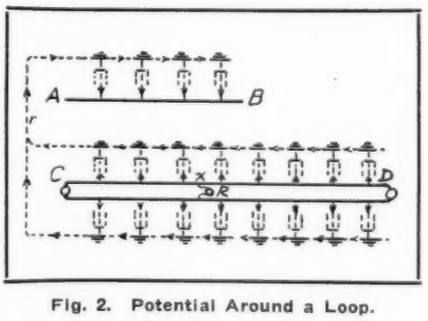


Fig. 2. Potential Around a Loop.

tentials and currents in the two sides will be equal in intensity, and, as before, the same in direction.

This is not exactly true, because in the span length of any one section the con-

ductors are not at the same average distance from the disturbing source and slight differences in current will result. But the nearer the transpositions are placed, the less will these differences be-

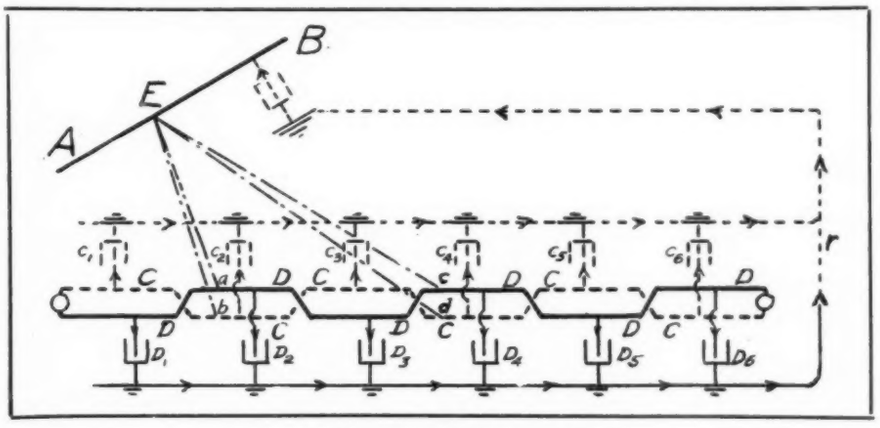


Fig. 3. Transposed Telephone Circuit.

come, and the balance over the whole be approximated. The transpositions then do not eliminate the induced currents in the sides of the line, but merely attempt to make them equal.

Currents will still flow along each side of the line and through the capacity to earth, but because they are so nearly equal in value, a receiver bridged across the line will divert only an imperceptible current, and the line will be quiet. Thus the line is balanced against interference by disposing each side electrically and statically equal with regard to the disturbing sources which may happen to exist in its vicinity.

To make this statement clearer, let us see what will happen when this balance is disturbed by a fault in the line. Suppose, for example, that one conductor is broken at some point, *p*. Then the even flow of currents along the two sides of the circuit is interrupted at *p*, with the result of a total rearrangement of currents. The differences will be greatest at the point, *p*, and diminish toward the two ends, but at any point a difference will exist, and the line will be noisy to a receiver bridged across it. It will also be noisy if a ground or cross exists at some point.

In the case of a ground, or a cross to ground, a direct path to earth will be provided, resulting in re-arrangement of currents, and attendant noise in the receivers. Also a cross to another wire, not grounded, but having capacity to earth, will allow the currents to escape faster from one side than from the other, thus unbalancing the line.

In all these cases of unbalancing, the noise apparent in the receivers increases with the length of circuit, while in very short lines it may be nearly imperceptible, even though the line is in trouble. This is because the currents of disturbance depend for their value upon length of circuit exposed to interference sources. On the other hand, cutting both sides of the line, or grounding both at the same point, does not give rise to any line noises, because both sides are still exposed alike and have like facilities for disposing of their induced currents. This fact has importance in some methods of testing for faults.

In the matter of balancing, reference

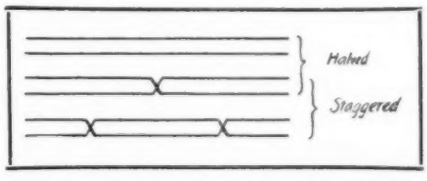


Fig. 4. Arrangement of Transpositions.

has already been made to necessity of maintaining the same electrical and static conditions in each side of the line. For instance, suppose it were required for some reason to insert a piece of apparatus in one side of the line which would add to the resistance at this point. It could only be done and the line still maintained quiet by the insertion of an equal amount of resistance in the other side, too.

This requirement of balance applies equally to phantom circuits. Not only must the two side circuits be transposed with respect to one another, but also the resistance and static balance must be kept the same. For example, if office drops are to be taken off of one side circuit, as in railroad systems where one side perhaps is a dispatching circuit, drops to correspond should likewise be bridged on the through circuit, even though they are never used for apparatus. In the case of a phantom, if it be desired to leg a branch line off of one side circuit, the branch must be taken off through a repeating coil; otherwise the metallic connection to the branch will build the static capacity of the latter to one side of the line and so destroy the balance of the phantom.

Coming now to systems of transpositions, that in Fig. 3 serves admirably when there is only one circuit on the lead. With more than one, however, additional arrangements must be used, for if the different circuits were all transposed alike, they would not be transposed with respect to one another, and interference would result. Therefore, a given section of any circuit must not only be transposed within itself to avoid interference from sources existing outside of the lead, but must, in its section length, be transposed against the inductive effect of all other circuits in the section.

As a starting point, fundamental com-

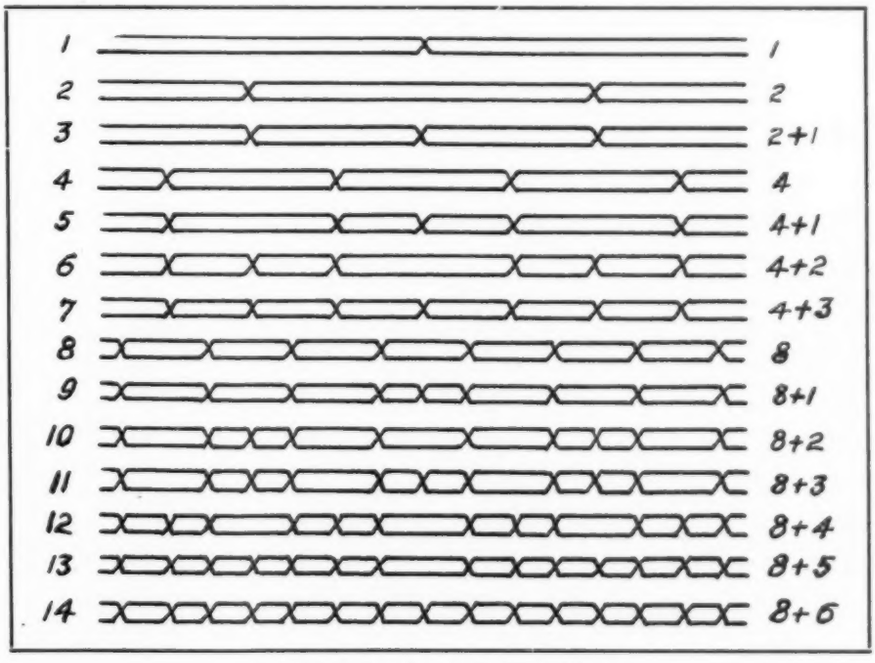


Fig. 5. Derivation of Transpositions.

binations are built up which are each neutral to the other combinations in the system. Then from these derivations the section is built up, and this section, in actual construction spanning a linear dis-

tance of four miles, perhaps, repeats itself as many times as the length of the lead requires.

In devising these basic combinations, there is only one underlying principle—

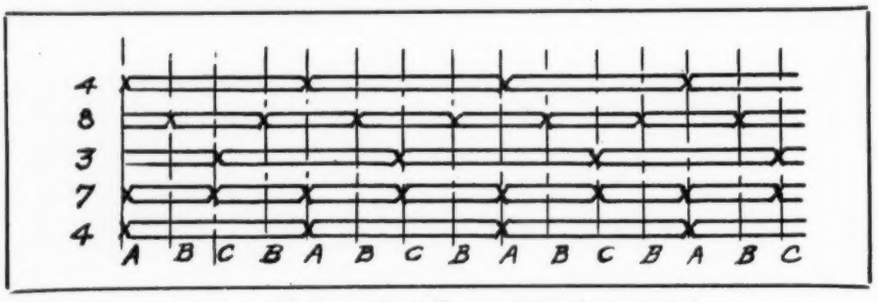


Fig. 6. A Commonly Used Transposition Arrangement.

the exposure of each wire of a pair at the same average distance from each wire of any other pair.

The achievement of this involves two means: Halving the section elements and staggering them, both of which are illustrated in Fig. 4. To derive the basic combinations needed in the plan for one section length, merely the successive repetition of halving and staggering and combining in shorter lengths is all that is required.

In Fig. 5 is shown a derivation scheme, and in Fig. 6 a commonly-used transposition arrangement employed without phantom circuits. A second arm added to the lead will bear circuits transposed with combinations different to those of Fig. 6, otherwise interference would result.

The arrangements for phantom circuits are more complicated due to transposition of the physicals. Modifications of the exposures shown in Fig. 5 have to be devised, and be put together in a tentative process until all parts of the section unit are transposed with respect to one another.

Mankato District Meeting of Minnesota Association.

The district meeting of the Minnesota Independent Telephone Association, held at Mankato, August 22, was an all around success. The call was answered by over 55 managers and other officers of companies within a radius of 100 miles. There were also present 63 operators and everybody seemed to be getting good measure for what was served on the program by the association and the bill of fare by the Mankato Citizens Telephone Co.

The weather conditions were as fine for this meeting as they were bad for the last annual meeting. The day was ideal and many of those in attendance motored to town from nearby and distant points.

The morning session was called to order shortly after 10 o'clock by President F. D. Lindquist, of Fulda, who after a few remarks turned the meeting over to Vice-President J. A. Schoell.

J. W. Howatt, supervisor of telephones of the Minnesota Railroad & Warehouse Commission, occupied the entire morning in discussing and answering questions after giving a short talk on the commission's lack of funds necessary to audit the books of any company, unless in exceptional cases; also that all companies should endeavor at this critical time to reduce their outstanding rentals to the minimum. He stated that there were many companies whose outstanding accounts averaged from $1 to $6 per station. In his opinion 25 cents would be more nearly the proper amount, in order to enable the companies to promptly meet their bills when due.

Recess was taken at 12:30 in order to have photographs taken, get better acquainted with the girls and partake of an excellent dinner, served in the Elks Club by the Mankato Citizens Telephone Co. Over one hundred guests of the company participated and an orchestra and vocal music assisted in making the meal a most enjoyable one.

After the cigars were lighted, the men remained in their seats for the afternoon session, while the girls left for school. F. E. Hoffmann, assistant statistician of the Minnesota labor department, gave a very interesting talk on the prevention of accidents and what the workmen's compensation law was doing in that state. After the talk there were some good questions put to the speaker and as many good answers were given.

B. S. Welsh, of Minneapolis, representing the Continental Casualty Co., talked on the advisability of group insurance among the telephone companies of Minnesota. Following the talk and discussion, a committee was appointed to look into the matter and report their recommendations at the next annual meeting.

Rollo R. Stevens, general commercial superintendent of the Tri-State Telephone & Telegraph Co., who recently succeeded D. M. Neill, spoke on the question of this being an opportune time (and a very necessary one) to increase rates by all the companies. There is no question but what the commission will receive many applications of this nature within a short time by those companies whose representatives heard Mr. Stevens.

L. A. Wrabek, manager of the Steele County Telephone Co., Blooming Prairie, Minn., spoke on the subject of better organization among the operators in order to obtain more efficient service. It was thought the operators' school held in connection with the district and annual meetings would go a long way toward increasing the value of the operator.

E. C. Kast, assistant secretary-treasurer of the association, spoke on what the association was accomplishing and urged every company to become a member as the most good can be done by all working as a unit. He had prepared a statement which was read, showing the comparative costs of material and equipment of today and February 1, 1915. While there were no decreases, the increases ranged from 13 to 130 per cent.

Others spoke briefly on various matters pertaining to the business and at 5:30 the meeting adjourned with a rising vote of thanks to the local telephone company and its never tiring manager, P. M. Ferguson, for the splendid entertainment given the visiting companies.

One of the big hits and features of the gathering was the operators' school, conducted by W. S. Vivian, of Chicago, secretary-treasurer of the United States Independent Telephone Association. There were two sessions of the school, one starting at 10 o'clock and the other at 2:30. The entire morning and part of the afternoon was devoted to instruction in local operating, while the rest of the time was given to long distance operating. Shortly after 4:30 the directors and other stockholders of the local company took all the girls in their automobiles for a ride around the city, visiting the beautiful parks and public buildings.

Many of the girls were anxious to know whether another such meeting would be held next summer, and that if so they surely wanted to attend.

Telephone Operator Ingeniously Traps Suspect.

The ingenuity of Miss May Jordan, telephone operator at the Commercial Acid Co., of East St. Louis, Ill., caused the arrest of Francis E. Millett, a former employe, suspected of plotting to blow up the plant, one of the largest manufacturing establishments of government explosives.

The police found among Mr. Millett's effects an Austrian coat of arms, insignia of the Red Cross to be worn on cap and sleeve, and calling cards representing him to be a Franciscan monk.

Mr. Millett had been calling up the plant almost daily asking whether "the explosion" had occurred. When he called recently Miss Jordan held him in conversation for 30 minutes while August T. Bahr, a special guard, traced the call, motored to St. Louis and arrested Millett in a store at Fourteenth street and Park avenue. He was still at the telephone talking to Miss Jordan.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—This Section, "Part VI, The Valuation of Telephone Properties," Written by Chas. W. McKay

Quiz Questions on the Preceding Installment.

264. Give a definition of obsolescence. What other forms of depreciation are of more importance from the standpoint of the appraisal engineer and the operating executive? Give an example of obsolescence depreciation.

265. What is extraordinary depreciation? Cite an illustration.

266. Present an illustration to show the relation of depreciation to appraisal work.

267. Upon what two factors does the annual rate of depreciation depend? What is meant by the term, "rate of depreciation"?

268. Give an illustration to show the distinction between depreciation and depreciation reserve.

269. Discuss the relative merits of the sinking-fund and the straight-line methods of building up a depreciation reserve.

270. Discuss the two viewpoints from which the subjects of depreciation and depreciation reserve may be viewed.

271. Discuss the confusion which arises has to depreciation and the depreciation reserve.

CHAPTER XVIII. Depreciation (Continued).

272. *Co-operation Between Appraisal Engineer and Accountant.*—Referring again to the distinction between depreciation and depreciation reserve, John A. Thomas, secretary-treasurer of the Lloyd-Thomas Co., industrial appraisal engineers, of Chicago, presented an exceptionally clear treatment of this phase of the subject in a recent article published in the Journal of Accountancy, New York.

Mr. Thomas directs attention to the fact that while the duties of the appraiser and those of the accountant are necessarily of an entirely different nature, nevertheless their respective duties are so interlocked that it is most important that each should have a clear understanding of what the other is trying to do. He further suggests that although the viewpoints of the appraiser and the accountant are different, each, in its way, is perfectly logical and a clear understanding of the function of each should be the first step toward the co-operation which is necessary to a proper solution of the problem of depreciation.

273. *Duties of Appraisal Engineer and Accountant.*—"The appraisal engineer," states Mr. Thomas, "is confronted with the task of determining the amount of depreciation, both physical and functional, that has taken place in a given plant. The duty of the accountant, on the other hand, is to provide a proper reserve fund for making good the ravages caused by depreciation. In the telephone field, however, it is usually necessary for the appraisal engineer to keep both of these viewpoints constantly in mind."

274. *Establishment of the Depreciation Reserve.*—With many of the larger companies the problem of establishing a depreciation reserve is considered strictly an engineering, rather than an accounting, problem. In other words, the chief engineer decides not only upon the depreciation of the plant, but also determines the proper method, or methods, of building up the reserve fund.

"If this fundamental difference (the difference between the engineer's viewpoint and that of the accountant) is kept in mind," says Mr. Thomas, "there will be no feeling on the part of the appraisal engineer that the accountant is 'depreciating' the plant values excessively; nor will the accountant, on the other hand, view the depreciation made by the appraiser as grossly inadequate.

"Putting the proposition in a mathematical form, let x equal the amount of actual depreciation that has taken place and y the amount of increase to provide a reserve fund for future contingencies and replacement. The function of the appraiser is to ascertain the value of x; the function of the accountant is to take x and determine what y would be. Manifestly if the appraiser terms x the actual depreciation and the accountant declares that x plus y is the actual depreciation, they will never agree. This shows that there should be a careful study that would lead to a mutual understanding of each other's views of depreciation, so that when one says, 'This is the actual depreciation,' it would mean the same thing to both. It will also be observed by this formula that the accountant is dependent upon the appraiser in order to know the amount of x.

It is not uncommon to hear the claim made that the plant has depreciated to an amount represented by the balance to the credit of the renewal fund. Were it not for the fact that many engineers are following the practice of using so-called standard tables in estimating present depreciation, deducing in proportion to the age of the plant, it would seem necessary to treat this claim seriously.

275. *Accumulation of Depreciation Reserve.*—"The establishment of renewal funds through 'depreciation' annuities can be likened to the accumulation of a fire insurance fund on a building. A building that has not yet burned has certainly lost none of its value by reason of a fire insurance fund existing to insure it; neither has a plant lost value because of a renewal fund that exists to insure its gradual or final replacement. On the contrary, the fact that such a renewal reserve is being maintained, is the strongest argument that all that is possible is being done to provide against impairment of investment and impairment of efficiency.

It is obvious that the renewal fund will accumulate faster than is really necessary in the earlier years of a plant's history, because the replacements during the earlier years will be comparatively few; but that after a number of years the expenditures for replacements and the contributions to the funds will somewhat more nearly balance each other.

It is evident that the percentage of depreciation that would show the present value should be a different amount from the percentage used to establish a renewal fund. Some authorities call the latter 'theoretical depreciation.' It might better be termed 'safety-first depreciation.'

276. *Theoretical and Actual Depreciation.*—"Theoretical depreciation seldom, if ever, works out in practice or actual experience, for the reason that it assumes a gradual constant reduction in the value of property during its life. It requires no argument to show that actual depreciation does not occur that way. The so-called 'average life' of a plant complicates the problem of depreciation. The use of this term creates the impression that the plant lives to the term set by the average life and then has to be renewed as a whole. Nothing could be farther from the truth. A property is not like human life; no mortality table applies. Renewals in a well-managed going concern are of constant occurrence. The plant is never wiped out and then entirely replaced except in the event of some calam-

ity like a fire or tornado; or, if it is, the occasions are very rare and hardly worth consideration. In such an event, the actual sound value, or insurance value, should be sufficient to replace it in as good shape as it was when the catastrophe occurred.

This could not be done if settlement were made with the insurance companies on the basis of depreciation shown by 'depreciation reserve account.' This is not saying that 'theoretical depreciation' is not right for its purpose. It is only wrong when it is substituted for and treated as actual depreciation. On the other hand, it is as wrong to take only the actual depreciation and say that it is a sufficient amount to provide for replacement. Actual depreciation is an impairment of capital, while the additional depreciation is a provision to preserve capital intact.

Some authorities hold that it makes no difference and that the appraisal engineer is not interested in the purpose for which the valuation is to be used. So far as ascertaining the reproduction value is concerned, this is true—but it does not apply to the percentages that are deducted from the reproduction value. In other words, the expert should know for what purpose his depreciated figures are to be used and the depreciated value should state what it intended to show. This does not affect 'the basis value of new replacement.'

We have seen that a percentage deducted, which would be adequate for the actual depreciation, would not be adequate to provide a renewal fund. Again if one were to calculate the sales value of a certain property to be removed and used elsewhere, he would be face to face with certain peculiar conditions. The appraiser must know these peculiar conditions. To illustrate: The removal of a special machine to some other place, for use in connection other than that for which it has been installed, might necessitate such a large expenditure for modification of design in order to make it useful elsewhere, that it would have little value after the expense was paid. To show this machine's sales value would necesitate a large percentage of deduction from its value to a going concern in its original place. Manifestly a sufficiently heavy percentage of depreciation to show a 'removal-sale value' would be absurd to use as the actual value to a going concern.

If one terms these different deductions 'depreciation,' it follows that a correct method of estimating depreciations for one purpose may be an incorrect or inadequate method to apply for another purpose.

A wise procedure is to maintain the plant in efficient condition through repairs and minor renewals paid from current income. The final renewals are made as required and the cost debited to the renewal reserve account. Each year there is debited to loss and gain, and credited to final renewal reserve account, the amount indicated by the estimate based upon the expectation of life of the several units of the plant.

It is important that, where reserve is debited on account of liability for future renewals, when those renewals are made, the expenditure therefor should be charged against renewal reserve account and not against the year's operating expense—otherwise the reserve would be building up indefinitely and the loss and gain account would show faulty conclusions."

(To be continued.)

Why Every Company Should be a Member of U. S. I. T. Association

By W. H. Hay

State Service Engineer, Eastern Traffic Association

The reasons why—the *vital* reasons why—every Independent telephone company should possess membership in the United States Independent Telephone Association, are so obvious they fairly leap at one.

As has been reiterated in this series of articles, the big outstanding reasons are: The attainment of complete co-operation; co-ordination of thought, purpose and action; and the "presenting a solid front to the adversary"—organization, which is needful, for the adversary is certainly organized, and powerful, and wily.

Without the relinquishment of one bit of the individuality, which is the pride of every Independent company, the banding together of *all* Independent companies in the United States association will result in a powerful, formidable *unit*. Isn't it the only winning formation possible?

Then there are the benefits which could not otherwise be obtained than through the medium of such association.

Membership in the association provides for your company strong, able representation at Washington, where your interests are safeguarded as regards unfavorable and possibly inimical legislation. You are in position to learn of such conditions *before* instead of after the fact, and to make your protest *heard* in such case. The stronger the organization, the more weight to your protest when it is necessary.

Membership in the association provides for you a channel through which you can interchange ideas and seek advice, if you wish it, on your problems of management, operation and maintenance. The experience, the knowledge of the telephone art, of scores of the best telephone men in the country (they are plentiful in the Independent field) are at your disposal. No one person "knows it all." Broad discussion is always helpful.

The association turned the attention of the Independent field at large to the necessity of standardization all along the line and its efforts have been and still are the means of accomplishing great strides in that direction. It has been largely instrumental in securing better standards of apparatus. Through its agency a book of long distance operating practices of the highest value is available to the Independent field.

It has been the means of instituting

W. H. Hay.

the holding of large operators' schools to which *your* operators can go and afterwards apply the benefits to your company, of the training received. Schools for telephone operators are no longer an experiment. Independent telephone companies in many states know it is money well spent to send their operators to them whenever the opportunity is presented.

Other works covering the best practice for exchange operation and maintenance will be forthcoming.

The *association* is accomplishing this.

And the cost of all this to you is almost negligible.

You need the association! The association needs you—your weight, your influence.

Give it by sending your application to Secretary W. S. Vivian, 19 S. LaSalle St., Chicago. *Do it now!*

Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies—Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Power Company Liable for Damage to Grounded Line.

Judge E. M. McCall, at Nevada, Iowa, filed his decision recently in a case that will be of vital interest to public service lines all over the state, when he held that the Cedar Valley Hydraulic Co. was liable for the cost of converting a grounded telephone line to a metallic circuit. The case was submitted on an admitted statement of facts in vacation and was from Franklin county.

In cases where a high tension electric line is constructed parallel to a telephone line which is a grounded line, such as the ordinary country lines are constructed, the service is impaired unless the telephone line is made a metallic circuit line. The case had previously been taken up by the railroad commission but it had divided on the question.

In the case in question the high tension company had constructed its line alongside of that of a line belonging to a small Independent telephone company and the matter had been taken into the courts, the plaintiff seeking to recover from the high tension interests the amount that it costs them to convert their line into a metallic circuit line. Judge McCall holds that they are liable for the amount claimed, which amounted to but about $500. The question involved is the important point in the matter, however, and not the amount.

This case will doubtless be appealed to the supreme court and the matter will be decided, thus securing a supreme court opinion on an important question regarding public service lines and their rights.

Lower Rate to Railroad Company a Discrimination.

The Nebraska State Railway Commission has informed the Naponee (Neb.) Home Telephone Co. that it must not make any discrimination between the Burlington Railroad and other subscribers. Jesse Mulica, secretary of the company, wrote to the commission stating that the railroad claims under a contract to pay $1 a month for its telephone in the passenger and freight station at Naponee.

The commission points out that it fixed a rate of $1.75 a month for business telephones by the company and that the instrument in the railroad station is a business telephone. Telephones are under the jurisdiction of the commission and not a matter of contract between individuals. The law permits no discrimination and the Naponee Telephone Co. is liable to prosecution if it does not collect the full tariff fixed by the commission.

Sacrifice of Owners a Consideration in Stock Issue.

The ruling of the Nebraska State Railway Commission that in passing upon stock issues for telephone companies it would take into consideration the sacrifices of owners and managers and permit stock to be issued to make up to them the difference between what they were paid and what they should have had has resulted in an informal application by Manager M. L. Jones of the Fairfield (Neb.) Telephone Co.

The company was organized 13 years ago by business men of Fairfield, who desired to protect their trade territory from the encroachments of companies then being built and extended in their neighborhood. Mr. Jones is a jeweler, and being the most active man in organizing the company, was induced to become manager. For some years he received but $25 a month. This salary was later raised, until now he is getting $65, and included in this is payment for his wife, who has kept the books of the company from the beginning.

The average pay for managers of exchanges of 400 telephones, the number on the Fairfield exchange, is $100 a month. The company has assets exceeding $18,000 and a capital stock of only $4,300, a majority of which is owned by Mr. Jones. He is preparing a formal application for permission to issue stock to himself for the difference between his wages in the past and the standard salary. The commission has indicated in several cases that it believes in the policy of telephone companies paying all employes proper wages, due allowance for which will be granted in the fixing of rates. The Fairfield company has paid as high as 30 per cent. dividends in past years.

Telegraph and Railroad Companies Cannot Exchange Service.

Judge Evans of the United States district court in Chicago has sustained the order of the Interstate Commerce Commission declaring invalid the usual provision in the contracts between the railroads and telegraph companies by which free service is given on both sides. The commission decided that the telegraph company must pay for its railroad service and the railroad company must pay for its telegraph service, notwithstanding any contracts.

Judge Mayer of the federal court in New York in a suit brought by the Baltimore & Ohio Railroad Co. against the Western Union Telegraph Co. some months ago decided against the latter company and held that the ruling of the commission was erroneous and the United States circuit court of appeals sustained that decision. Judge Evans, however, in a suit brought by the Postal-Telegraph Cable Co. against the Chicago Great Western Railway Co., has reached a contrary conclusion and has held in a decision just handed down that the commission was right in its decision and therefore, decides in favor of the Postal company. This decision is of far-reaching importance in the relations between the railroads and the telegraph companies.

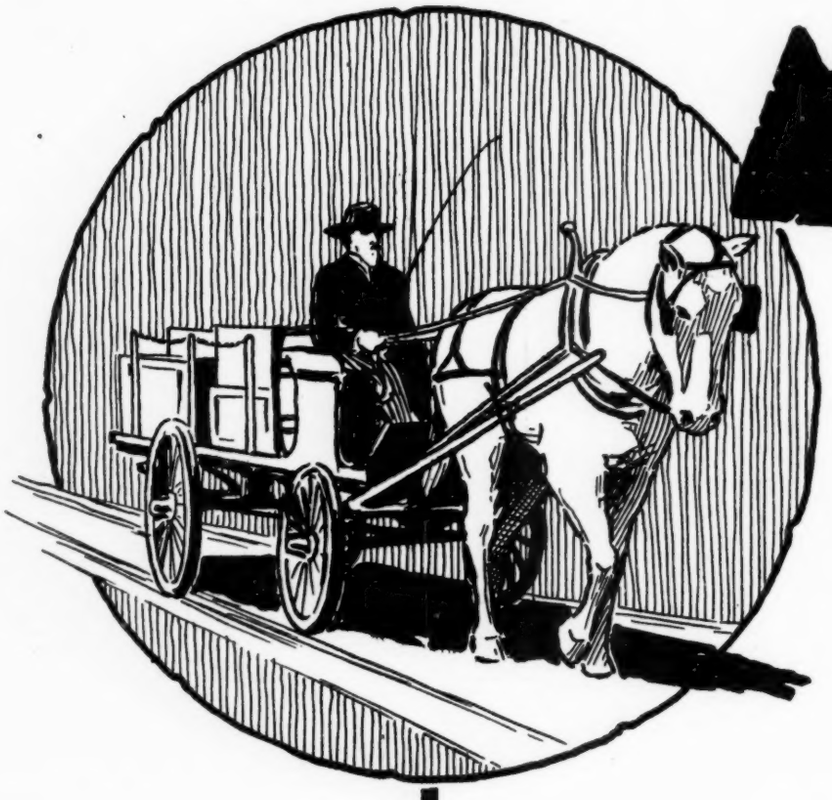
New England Company Curtailing New Installations.

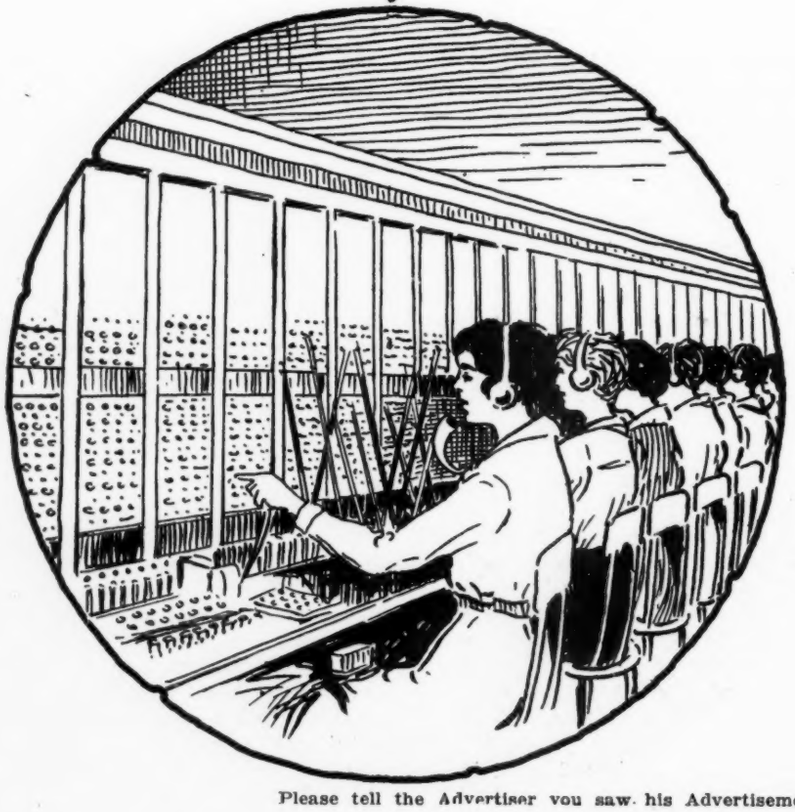
On account of the requirements of government service, the shortage of labor and of materials, the New England Telephone & Telegraph Co. recently sent a bulletin to its division superintendents urging them to do everything feasible to induce prospective customers to postpone new installations for the time being. The bulletin pointed out that the company is at present confronted with an extremely irregular and limited supply situation and that present conditions would have existed a year ago if the management had not anticipated the situation.

The bulletin states in part:

"We have built in advance telephone plants, both inside and outside, of all kinds, such as central office buildings, switchboards, cables, toll lines and other accessories. We arranged in advance for all sorts of material as long as it could be obtained.

"Our engineering forces have developed in advance substitutes to take the place of many materials now impossible to secure and they have also improved construction and maintenance methods to effect savings in these lines. The present critical conditions in this country have imposed a very unusual strain in furnishing unprecedented telephone facilities required by our government, not only in connection with our extensive military operations, but with the mobilization of the resources of the nation. In spite of all that has been done to anticipate present conditions, the general demands for men, the general conditions of the raw material market and the difficulty with transportation facilities





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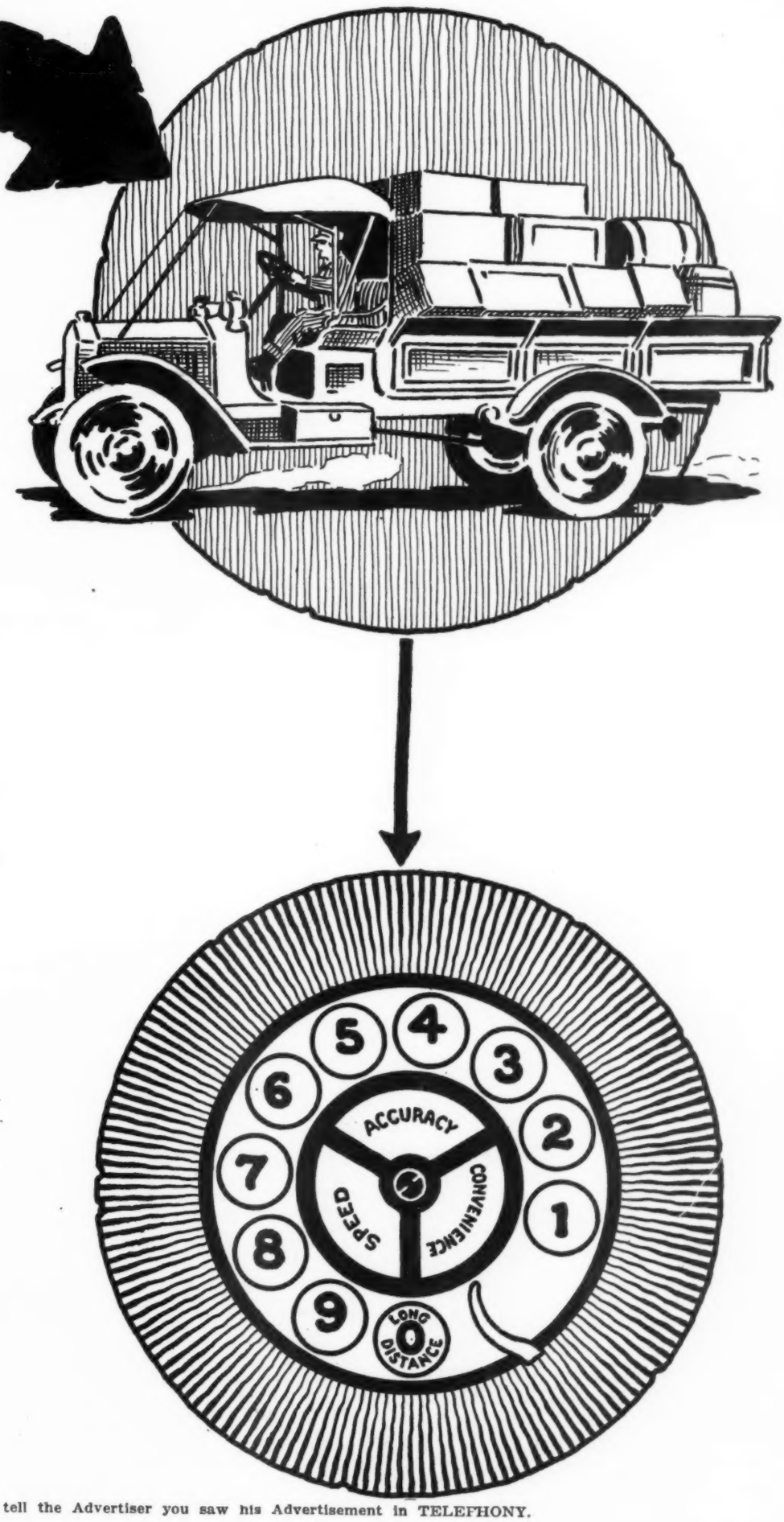


are such that it is practically impossible to obtain our different kinds of plant supplies at the proper time and way so that we could put them together to take care of our unusual growth.

"It would be very unpatriotic, under such conditions, almost criminal, to dissipate our existing resources for regular commercial purposes until sure that the ultimate needs of the government and the public have been properly and positively provided. Although our foresight and resourcefulness have so far enabled us to maintain our regular commercial service and at the same time fully take care of all the requirements, under the present situation, the future needs of the government and the public welfare are obviously not properly and positively provided for. We hope the postponement of this service will not be for long and we believe every patriotic citizen will appreciate the conditions under which we are trying to meet the situation."

It is understood that the company has no present intention of stopping the installation of all new service. Wherever telephone service is required for emergency use, as in cases of illness, and in other cases where immediate need of service is demonstrated to the satisfaction of the company, both in the business and residential field, it is expected that every effort will be made to provide the desired facilities or their equivalent. So far as possible the new installation work will be spread over a longer period than theretofore.

A hearing on this matter was scheduled by the Massachusetts Public Service Commission for August 29, at which time the possible use of other than Western Electric equipment was to have been considered by the board.

Power of Legislature to Grant Use of City Streets.

Under the legislative grant by Iowa code 1873, § 1324, as amended by acts 19th general assembly, c. 104, a telephone company had the unlimited right to use the public streets of a city for its poles, wires, and apparatus, rent free, and this right continued until revoked by the state in the exercise of its reserved powers, since as the state has not only all the powers delegated to a city, but complete and plenary powers over all matters which it may delegate, it was within the powers of the legislature to make such grant.—City of Des Moines vs. Iowa Telephone Co.; Supreme Court of Iowa; 162 Northwestern, 323.

Injury to Lineman by Current from Power Line.

Where electric power company constructed its line on a highway over and across a telephone company's service line, the court held that whether it was negligent in failing to protect such wires from contact with telephone wires, whereby a telephone lineman was injured, was for the jury, although the accident occurred in a manner which the power company could not foresee in specific detail.

In such a case, a lineman injured while engaged in repairing the telephone service wire was neither a wrongdoer, nor a mere naked licensee, so far as defendant power company was concerned. —Toney vs. Interstate Power Co.; Supreme Court of Iowa; 163 Northwestern, 394.

Power of Telephone Corporation to Purchase Stock.

Under Michigan comp. laws 1915, § 8791, providing that it shall be lawful for certain corporations to purchase and hold a portion of the stock of any corporation, owning or controlling, by patent or otherwise, the use of any instrument or device necessary to carry out the purposes of its organization, a telephone corporation, under some circumstances, has the right to purchase and hold a portion of the stock of another telephone corporation, and a bill alleging illegal purchase of stock of such second corporation is defective if it fails to state the particulars wherein the purchase was illegal.—Chapin vs. Citizens Telephone Co.; Supreme Court of Michigan; 162 Northwestern, 958.

Improperly Placed Wires.

The fact that a railway brakeman, walking on top of a furniture car in discharge of his duties, was struck by a telephone wire above the track, alone was evidence that the wires were within the railway zone, from which jury might infer negligence. — Southwestern Telephone & Telephone Co. vs. Clark; Court of Civil Appeals of Texas; 192 Southwestern, 1077.

Summary of State Commission Hearings and Rulings.

ALABAMA.

September 18: Hearing resumed in the matter of the petition of the city commission of Birmingham for reduction in rates and charges of the Southern Bell Telephone & Telegraph Co. for service in Birmingham.

CALIFORNIA.

August 16: Application filed by the Home Telephone & Telegraph Co., of Los Angeles, for authority to distribute assets as dividends to holders of preferred and common stock; to settle the indebtedness of the company, and finally to distribute the remaining assets. The company received permission from the state railroad commission several months ago to sell its working plant to the Southern California Telephone Co., subject to a bonded indebtedness. It received from the latter concern $8,782,000 in 5 per cent. bonds, of which $4,027,000 were transferred in trust to be exchanged for a like amount of outstanding bonds of the Home company. It is now seeking permission to declare an accumulated dividend of $500,000 in cash to be distributed to the holders of preferred stock, also to declare a dividend on $6,000,000 of its common and preferred stock in bonds of the Southern California Telephone Co., making a total of $4,500,000 to be distributed at the rate of $75 per share.

August 24: Application filed by the Pacific States Telephone & Telegraph Co. for permission to convey all its rights in California to the Pacific Telephone & Telegraph Co. The Pacific States company until 1907 operated the general system now conducted by the Pacific Telephone & Telegraph Co., but since that date has not been active in any business, nor does it own any property in California but rights of way, which are what it proposes to transfer for a nominal sum.

ILLINOIS.

August 8: The commission dismissed the petition of J. Fred Scholl and others asking the annulment of a five-cent toll charge between the exchanges of the Polo Mutual Telephone Co. and Dixon Home Telephone Co. The dismissal order said the petition would deprive the companies of revenue to which they were entitled and would result in congestion of the wires with unnecessary business.

MINNESOTA.

August 29: Hearing in the matter of the application of the Blue Earth Valley Telephone Co. for permission to increase its exchange rates at Blue Earth and Winnebago.

August 30: Hearing in the matter of the application of the Blue Earth Valley Telephone Co. for permission to increase its exchange rates at Wells, Minn.

NEBRASKA.

August: In the matter of the application of the Platte Valley Telephone Co. for authority to publish certain supplemental rates at its various exchanges, the commission gave the company permission to increase its farm line business service to 50 per cent. more than its farm line residence rate which is $1.50 a month, making it $2 a month. The company has exchanges at Gering, Scottsbluff, Minataire, Melbela and Morrell.

September 17: Hearing on application of Dawson-Nemaha Telephone Co., of Dawson, Neb., for permission to publish new tariff increasing business and residence rates.

OHIO.

August 14: Application filed by the Home Telephone Co. of Chillicothe for permission to buy property of the receivers of the Central Union Telephone Co., located in Chillicothe, Bourneville, Richmondale and that vicinity. The purchase price is fixed at $41,000.

In the application, the Home company says it is making preparations for extensive telephone service for Camp Sherman, the military cantonment at Chillicothe. The commission ordered an inventory of properties to be completed and filed by November 1.

SOUTH DAKOTA.

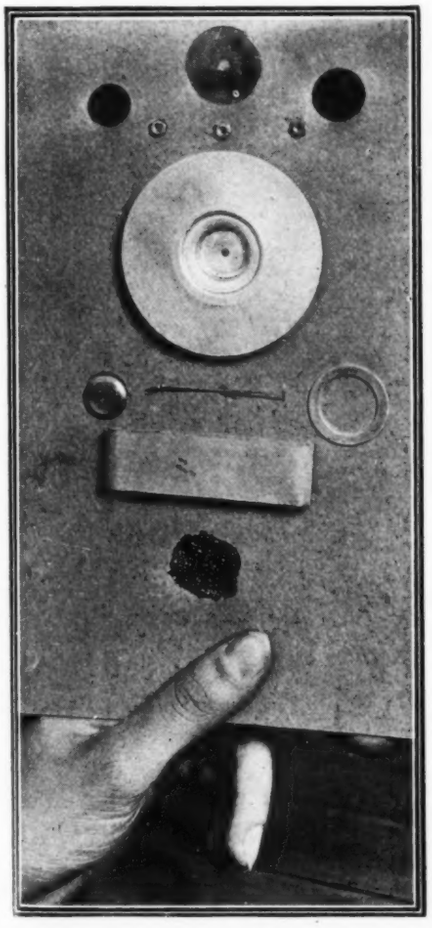
August 18: The commission authorized the West Miner Telephone Co. to increase its rates from $1 per month to $1.50 per month or $18 per year payable quarterly in advance, a discount of 25 cents per month to be allowed where the rental is paid during the first half of the current quarter. The company operates in the vicinity of Carthage, Miner county. Order 2735.

A New Transmitter Developed

Agitation Type of Transmitter, Which Uses One Cell of Dry Battery and Gives Excellent Transmission Through 59 Miles of Artificial Cable, Now Ready for Market—Details of Transmitter and What it Will Do

That simplicity is the keynote of efficiency and perfection is well exemplified in a new telephone transmitter that has just been invented by William and James Birrell.

For many years telephone transmitters have been of the same type and form, the fundamental principle of them all being



Parts of the Audible Transmitter.

the compression of carbon granules between two or more electrodes, thus varying the resistance of the circuit.

This new transmitter, which is the result of research work by men who have made a close study of telephone transmitters, does not depend upon compression but rather upon agitation of the carbon granules between the electrodes to vary the resistance of the circuit.

This means of varying the resistance of a circuit is said to eliminate many of the faults found in the present-day transmitter. For instance, in this new transmitter, the cup containing the resistance medium is part of the diaphragm. It has no mechanical connection whatever with the case; in fact, as is shown in one of the illustrations, the transmitter can be removed from the case and while held in the hand, will transmit the voice with wonderful clearness. The case for this transmitter is used simply to protect the diaphragm from injury, whereas in the common type of telephone, the case is part of and mechanically connected to the cup containing the resistance medium.

Numerous tests have been conducted in the company's laboratory with standard instruments in the presence of many engineers and telephone men. Over an artificial cable consisting of one unit of 35 miles and four units of six miles each, making in all a cable of 59 miles, the following test was made:

The bridge, diaphragm, etc., were removed from the front plate of a well-known transmitter and the Audible transmitter substituted, using the damping springs which had been left in position as a means of holding it in place. With this change and using one cell of dry battery at each end of the line into which 35 miles of cable had been placed, the voice came through clear and distinct.

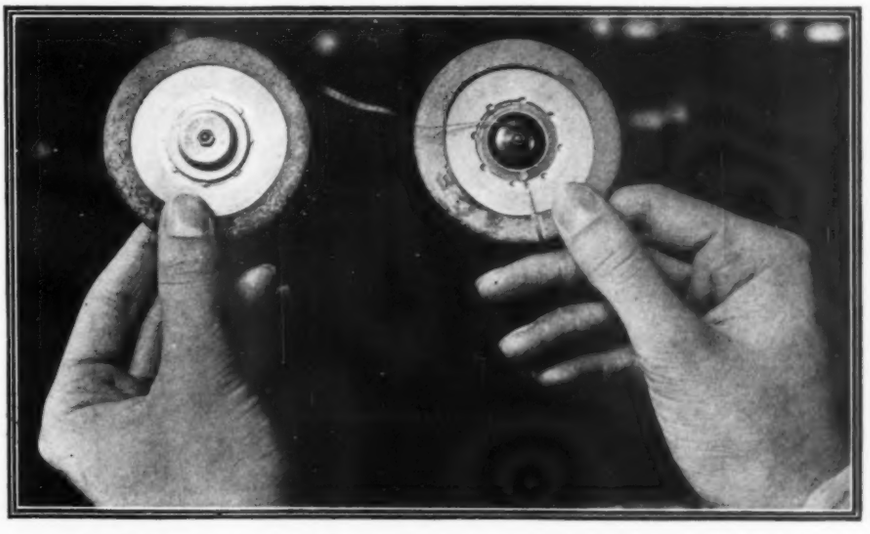
The six-mile sections of cable were then added, one at a time, until the total of 59 cable miles were in the line. At this distance the voice came through with all its characteristics and sufficiently loud.

In one of the accompanying illustrations, the transmitter is shown submerged in a bowl of water—the presence of the gold fish seemingly having no effect on the transmission. This transmitter, while still submerged and with the mica disk punctured to allow the water to enter the carbon cup, transmitted the

Casing Not Required for Talking.

voice perfectly through 35 miles of standard artificial cable. This test was made to find what effect dampness would have on the transmitter.

The engineers of this company have not contented themselves with laboratory tests, but have placed several transmitters in use on lines where previously transmission was exceptionally bad. The results obtained from the use of the Audible transmitter were most satisfactory, especially to users of the lines. In one case a successful test was made over a line 107½ miles long, consisting of 100 miles of standard metallic line and 7½ miles



Front and Rear Views of Audible Transmitter Showing Construction Details.

of farm line—mostly barbed wire fence. This was a temporary line, as a flood had recently occurred in that territory.

In another case a private line was selected, running from an electric generating plant to a substation. In this case the noise of the generators, etc., made it almost impossible to transmit simple orders when using a transmitter of standard make. With the installation of the Audible transmitter, however, no difficulty was experienced in communication between the two places.

It has been tested for train dispatching purposes with excellent results. On a railroad near Chicago, the telephone line is 460 miles in length, simplexed the entire distance. No. 9 B. & S. copper wire is exclusively used with the exception of a one-mile section of submarine cable and 12 miles of ordinary cable. This is telegraph cable with quads and duplex running through it. The Audible transmitters were placed on this line with a distance of 443 miles between them and the voice came up remarkably clear and distinct, although a number of dispatching stations were in on the line, each receiver adding 650 ohms to it.

It is stated that the conditions on this railroad dispatching line provide an unusually severe test. Heretofore it has been impossible to talk between the two points. Estimating the effect of the telegraph cable and the other conditions, it is believed that the distance talked over is the equivalent of about 2,500 miles of open wire—and that over an unloaded line.

These new transmitters are also in use and giving excellent results in a factory where dampness had put out of service, shortly after their installation, telephones of the compression type.

In all the tests, both laboratory and actual installations, the absence of side tone effects has been remarked by those witnessing the operation of the transmitters.

Tests were made of the resistance of the transmitter and it was found to be 50 ohms when the receiver was removed from the hook and no talking or other noise in the room. When there was talking, the resistance increased to 105-110 ohms. It varied between 110 ohms and 60 ohms and at no time came back to the normal or no talking resistance of 50 ohms. In measuring current consumption it was found, with four dry cells in circuit, to vary from .09 ampere with no talking to .04 ampere when talking began.

These same ratios were maintained

Submerged Audible Transmitter Gave Perfect Transmission through Surface of Water.

Inventors of The Audible Transmitter Telephoning Over 59 Miles of Artificial Cable, Using Standard Desk Set.

when three and two cells were in a circuit. With one cell, which is what is used ordinarily for talking purposes, the current consumption varies from .02 ampere to a little less than .01 ampere.

An interesting feature of this Audible transmitter is its simplicity of construction. This is well shown in the illustrations, one of which shows the component parts—12 in number—while another presents front and back views of the finished transmitter.

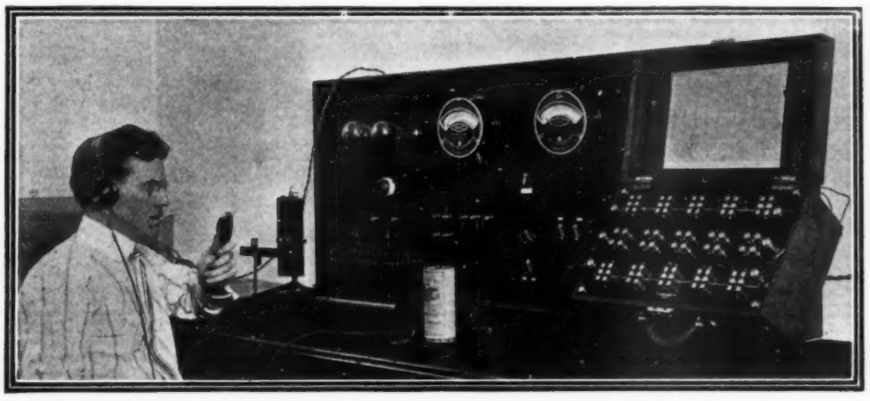
A novel development in this transmitter is the method whereby the carbon cup is sealed after the carbon granules, electrodes, etc., have been placed in the cup. An aluminum ring is forced into a recess provided for it at the top edge of the cup and the metal of the diaphragm punched or laid over the ring, thus holding it firmly in place. It will be noticed that a thin piece of brass is placed underneath the ring to provide a terminal to which a connecting wire can be soldered.

The company's factory at 201 East Ohio street, corner of St. Clair and Ohio, Chicago, is now manufacturing the following types of instruments: The transmitter, the intercommunicating or hand set, the auto-phone and the regular commercial desk set, also a few other types for special purposes.

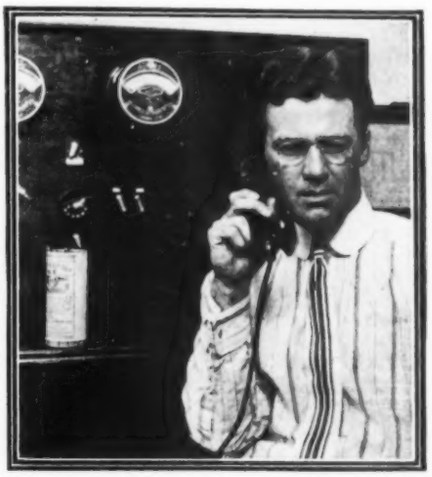
The Audible transmitter, as it is made, can be inserted in almost any type of transmitter case now in use. This is done by simply removing the bridge and diaphragm from the front plate and utilizing the damping springs to hold the Audible transmitter in place.

As shown in one of the illustrations, a hand set has been developed for intercommunicating systems, which is very novel in construction, possessing as it does many features not found in other types of instrument. It will be noted that the receiver is placed in the handle, making a well balanced instrument. The receiver diaphragm, being down in the handle, is thus protected from injury. Still another interesting point is the fact that no mouthpiece is used, it having been found unnecessary with the Audible transmitter as it is used in this set.

The set shown in one of the illustrations for automobile purposes is known as the auto-phone. The purpose of this instrument is to enable the occupants of



Testing the Auto-phone over 59 Miles of Artificial Cable.



Using the Audible Hand Set.

A Section of the Factory Capable of Turning Out 1,000 Audible Transmitters Daily.

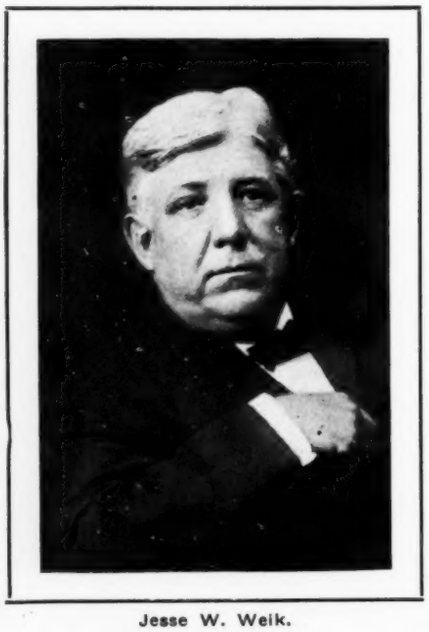
the car to give orders to the chauffer sufficiently loud to be heard over street noises. A receiver and a small horn are installed above the driver's seat. In use, this transmitter conveys the message loud and distinct, but not harsh.

The company also manufactures a regular desk set, as shown in one of the illustrations, which is a very light and well-balanced instrument. A feature of this instrument is the fact that a movable joint between the stand and transmitter case is not used.

This new transmitter which, as has been indicated, is known as the Audible transmitter, is being manufactured and sold by the Audible Telephone Co., R. A. Cavenaugh, president, 332 South Michigan Ave., Chicago. Companies desiring to know further of its merits will be promptly furnished with the information.

Biographical and Personal Notes

Jesse W. Weik, president of the Greencastle Telephone Co., Greencastle, Ind., was born in Greencastle, August 23, 1857. After graduating from Asbury University he took up the study of law.



Jesse W. Weik.

He was admitted to the bar in 1880 but has never practiced.

In 1894 Mr. Weik organized the Greencastle Telephone Co. and has continued in active charge ever since. He has also been active in the district and state association affairs and attended the first national convention in Detroit in 1896.

Prior to engaging in the telephone business, Mr. Weik was special examiner for the United States Pension Bureau in 1882. While examining into the merits of some claims near Springfield, Ill., he became interested in the career of Abraham Lincoln, interviewing many people who had known Lincoln, in regard to his life and history, also continuing his investigations in Kentucky.

As a result, he assisted Mr. Lincoln's law partner in producing Herndon's Life of Lincoln, in 1889, and a revision in two volumes, Herndon & Weik's Life of Lincoln, 1892. Mr. Weik has also made numerous contributions to newspapers and magazines on historical subjects.

Mr. Weik is a man of high moral worth. Versatile and agreeable, he can tell many stories in an interesting manner. He is refined and has high ideals although of a most practical nature. He is a capable manager and executive, seeing things in a broad-minded way. He is a member of the American Historical Association, Lincoln Fellowship and Author's Club of London.

S. M. Greer, general commercial superintendent of the Chesapeake & Potomac Telephone Co., of Baltimore, Md., has given up his important position with that company to assume a position at the head of a newly organized department of the American Red Cross, and it is announced that the new work will require all of his time and attention for an indefinite period.

Paul Reed, for the last five years manager for the Southwestern Telegraph & Telephone Co. in Gainesville, Texas, has resigned his position to accept service with the Southern Pacific Railway Co. at El Paso, Texas. He will be manager of that road's telephone system, which is used for the dispatching of trains.

J. M. Carroll, who for some years has been district manager for the Southwestern Telegraph & Telephone Co. in ten Central Texas counties, has been promoted to the position of district manager for the same company at San Antonio.

Dr. C. L. Jones, manager of the Athens County Home Telephone Co., Athens, Ohio, was a visitor at TELEPHONY's offices early this week. Dr. Jones reports increasing activities in the telephone field in his section of the state.

Scott Hendricks, of San Francisco, president of the Oregon-Nevada Telephone Co., has accepted service with Herbert Hoover in his food control administration work during the period of the war.

B. F. Marbold, president and owner of the Menard Telephone & Telegraph Co., of Greenview, Ill., has sold his plant to C. B. Cheadle, of Joliet, and E. S. Sterritt, of Henry, Ill.

Frank Anderson, wire chief of the Mountain States Telephone & Telegraph Co. at Caldwell, Idaho, for the past five years, has been promoted to the management. He succeeds H. C. McBirney.

F. B. MacKinnon, of Washington, D. C., vice-president of the United States Independent Telephone Association, was a visitor at TELEPHONY's offices this week.

Richard L. Swindler, for the past six years general manager of the Home Telephone Co., of Ozark, Ark., is a native of that state and acquired his education in the grade and high schools. Although an orphan at the age of eight, the young lad steadily forged his way ahead.

Prior to entering the telephone field, Mr. Swindler was for seven years general manager of the shoe department in a general merchandise store at Ozark. In addition to his telephone connections at the present time, he is general manager and president of the Oklahoma Tire Filler Co., state agents for the National tire cushion.

Mr. Swindler has served on the city council of Ozark for four years; he is secretary of the Ozark Road and Motor Club and corresponding secretary for the Crescent Theater, of Ozark.

He has been active in state association affairs, having served two years as president of the Arkansas Telephone Association and being at present a member of the executive committee.

Mr. Swindler is an energetic, enthusiastic type of telephone man, a good executive and planner, with the ability to carry out his plans. Of a diplomatic nature, Mr. Swindler is successful in dealing with employes and the public in a manner conducive to the greatest harmony.

Richard S. Swindler.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

756. What does the current flow through the relay connected to the tip side of the cord circuit do? The current flow through the relay connected to the sleeve side?

757. Outline the operation of a simple recording trunk circuit which may be employed with common battery equipment using a differential line relay. What is the effect of the insertion of the recording operator's plug on the lamps of the recording positions?

758. What is the only requirement impcsed on the circuit design in the matter of service toll trunks, by the use of multiple toll switchboard equipment?

759. In what two ways may the necessary circuit changes be produced when a connection is made with any mutipled line circuit? In what respect is the multipled toll line circuit similar to the three-wire common battery multiple line circuit? How are practically all the modern toll service toll trunks terminated at the local switchboard? What is the common practice in regard to disconnecting the local end of the toll service trunk? What is the common practice in ringing the called local telephone for toll connections? Is it universally true that the toll operator's cord circuit is wired to supply the operating current for the local trasmitter?

760. What causes the trunk lamp in Fig. 234 to become bright? What causes it to be darkened? When does the local operator, using a trunk circuit similar to

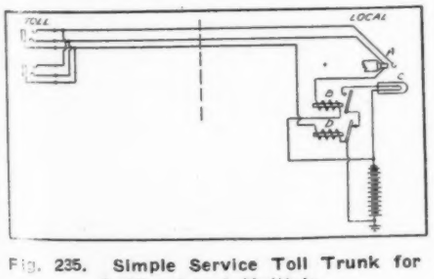


Fig. 235. Simple Service Toll Trunk for 2-Wire Local Multiple.

the one shown in Fig. 234, disconnect from the local multiple jack? How does the toll operator know which one of the many trunk multiple jacks before her is to be employed for any given toll connection? How is the local multiple jack made busy to all intruding calls while the service toll trunk plug is resting in its multiple jack? How is the trunk multiple jack on the toll switchboard made busy to all intruding toll operator's tests?

761. What is the difference between the circuit shown in Fig. 234 and the one shown in Fig 235? Is the method of operation of the equipment the same in Fig. 235 as it is in Fig. 234? Why is the relay *B*, attached to one side of the talking circuit in Fig. 235?

CHAPTER XXVI. The Multiple Toll Switchboard (Continued).

762. *Simple service toll trunk for local equipment using the differential line relay.*—The multiple differential line relay local common battery circuit is a two-wire arrangement but the trunk arrangement shown in Fig. 235 is not suitable for employment with two-wire local equipment of this character. The elements of the service toll trunk adapted for use with local equipment employing the differential line relay are shown in Fig. 236.

It will be remembered that the non-grounded terminal of the common exchange battery is, in the differential line relay arrangement, connected to *both* strands of the local cord circuit. In the conventional common-battery cord circuit, the non-grounded terminal of the common battery is connected to one strand (usually the ring) and the grounded terminal to the other strand of the talking circuit (usually the tip). Accordingly, the flow of current over the *tip* strand of the local cord is the one that must be employed to operate the disconnect lamp relay, *B*, at the local end of the service toll trunk.

In Fig. 236, therefore, the flow of current through the trunk lamp relay, *B*, when the trunk plug is inserted into the local multiple, operates the differential line relay of the local circuit. It is extremely important in the differential line relay type of equipment that this current be constant and of sufficient strength to operate the differential relay positively. This is because the circuit to the local telephone station is maintained *through* normally-open spring contacts operated by its armature.

Obviously the method of operation of the trunk circuit shown in Fig. 236 is the same as that of the other multiple service trunk circuits which have been presented and the disconnect lamp, *C*, is entirely under the control of the toll operator.

763. *Current supply trunk circuits.*—In many ways the employment of simple toll trunk circuits in which the operating current supply for the local transmitter is derived from the toll switchboard cord

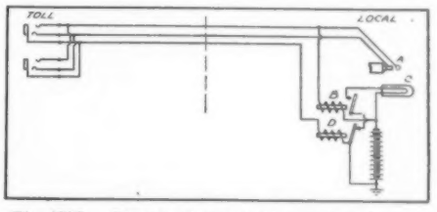


Fig. 236. Simple Service Trunk for Differential Line Relay Local Multiple.

circuits, is a great advantage. It is obvious, however, that such an arrangement involves a more expensive equipment for the toll cord circuits than would otherwise be necessary. The addition of current supply reactances, on the other hand, to the toll cord circuits affords a means by which the toll operator may be given supervision over the condition of the local end of the toll connection.

There are many telephone systems, especially in the larger exchange areas, in which the simple type of toll trunks that have been described would not be suitable. This is because the local offices are scattered, oftentimes situated at a long distance from the toll switchboard, involving a serious transmission loss if an attempt is made to supply transmitter operating current to the local telephone over the trunk from the toll switchboard.

In such cases, it is advisable to supply an increased operating current to the local transmitters, lengthening the local line circuit and the toll switchboard by inductive means rather than by direct trunk conductors. This involves the insertion of a repeating coil or its equivalent between local station and the toll switchboard in both the recording and the service toll trunk circuits.

764. *Reason for repeating coil trunk circuits.*—In such trunk circuits there is another very desirable feature due to the possibility of installing the repeating coil or other inductive link in the circuit at the local office instead of at the toll switchboard. The voltage of the common battery supplying current for the oper-

ation of the local transmitters on such trunk circuits may be made higher than the voltage of the common battery in use on the other part of the local equipment.

In this way a stronger operating current is actually sent through the local

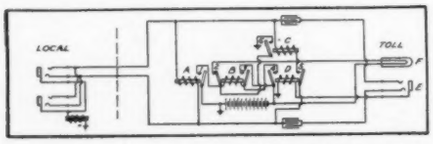


Fig. 237. 2-Wire Recording Trunk with Condenser.

telephone transmitter when it is connected to a toll trunk than is sent through it when it is connected with another local circuit through the medium of the standard operator's cord circuit. The resulting outgoing transmission from the local station is considerably stronger in such cases on toll connections than it is on local connections as a result of stronger current passing through the local transmitter.

There are other reasons which dictate the use of trunk circuits for long distance service including a repeating coil in such exchanges. One of the most obvious reasons for the use of a trunk of this general character is the possibility of designing a trunk circuit requiring only two conductors between the toll switchboard and the local office where the local equipment is of such character that a three-wire trunk would be necessary without the repeating coil.

765. *Two-wire recording trunk circuits.*—In Fig. 237 is shown a simple two-wire recording trunk circuit having condensers in series with each side of the circuit between the local and the toll switchboards. This particular circuit is in use in an exchange employing the conventional two-wire common battery local equipment.

When the operator inserts the local cord into the trunk jack at the local position, relay *A* of the trunk circuit is energized by the flow of current over the tip of the local cord, the tip of the trunk jack, the winding of the relay, *A*, the ring of the trunk, and the ring of the local cord. Relay *A* is of a very high resistance, approximately 15,000 ohms, and when energized by the flow of current over the trunk circuit its armature completes the energizing circuit for the trunk recording lamp. This circuit may be traced through the normally-closed contact 2 of relay *B*, and the lamp *F* to the common battery.

When the recording operator inserts a plug in the jack *E* in answer to the signal displayed by lamp *F*, relay *D* is energized by the flow of current over the sleeve contact of the trunk jack. The operation of the armature of relay *D* closes the circuit between the two sides of the trunk toward the local office and the relay *C*. This results in the energization of the relay, *C*, and through its spring contact 4 and the winding of relay *B* in the energization of relay *B*.

After the armature of relay *B* has opened the lamp circuit at contact 2, extinguishing the signal lamp, and has closed the relay spring contact 3, a path for the flow of current may be traced from the common battery through spring contact 3 of relay *B*, the winding of relay *B*, and spring contact 6 of relay *C* to ground.

It is obvious, therefore, that relay *B* will be energized as long as relay *C* is energized, or should relay *C* be released, as long as relay *A* is energized. This is because both relay *A* and relay C maintain a ground connection on the winding of relay *B*.

The connection of relay *C* across the trunk circuit when the toll-recording operator inserts a plug in jack *E*, releases the armature of relay *A*, owing to the fact that the lower resistance of relay *C* shunts the trunk current away from relay *A*. When the toll operator removes her plug from the jack *E*, relay *D* is released which releases relay *C* and, if the local cord plug is still in the local trunk jack, the disconnection of relay *C* from the trunk will cause relay *A* to be re-energized, the shunt due to *C* being removed, and relay *B* will be retained in its energized condition until the removal of the local operator's plug from the trunk multiple on the local switchboard.

It is obvious that with this trunk circuit an ordinary magneto cord circuit may be used at the toll board having battery connection on its sleeve contact only. The condensers in each side of the trunk circuit limit the flow of current from the local cord over the trunk circuit to the several relays and bar the flow of current from the toll terminal of the recording trunk.

766. *Resistances of relays.*—It is to be noted that the resistance of relay *A* in the recording trunk circuit shown in Fig. 237 is so high that the supervisory relay of the local cord circuit connected with the trunk at any given time, will not be operated. This is true although a sufficiently strong current will pass through the

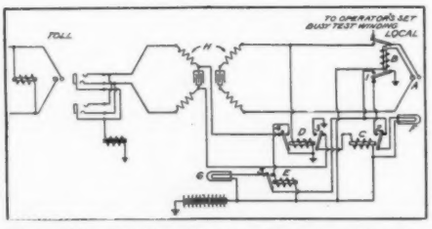


Fig. 238. 2-Wire Service Trunk with Repeating Coil and Balanced Reactances.

winding of the local supervisory relay to assure the operation of trunk relay *A*.

The supervisory lamp in the local cord circuit will remain dark, therefore, until the toll recording operator shall have answered the trunk signal displayed at her position by inserting the plug into the trunk jack. When this is done, the resulting operation of the trunk relay equipment connects the low-wound relay, *C*, directly across the trunk circuit. This relay, being of lower resistance, will permit the passage of sufficient current to operate the supervisory relay at the local position, apprising the coal operator that the call is being given attention by the recording operator.

The connection of a high-resistance relay across the talking circuit of a trunk to be operated by current passed by a supervisory relay without operating the distant supervisory relay at the same time, being operated itself, is a rather common expedient. For this reason the arrangement is worthy of careful study and attention.

767. *Simple two-wire repeating-coil type service toll trunk.*—The design of service toll trunk circuits when the more simple types of trunks are not suitable, must conform to the circuits used in the local equipment as well as those used in the toll switchboard. In the simple toll service trunk circuits that have been outlined, it has been assumed that the cord circuits on the toll switchboard are provided with suitable reactances for the delivery of operating current over the trunk, to the local telephone transmitter. Such reactances would, ordinarily, be incorporated in the structure of a supervisory relay associated with the toll switchboard cord circuit.

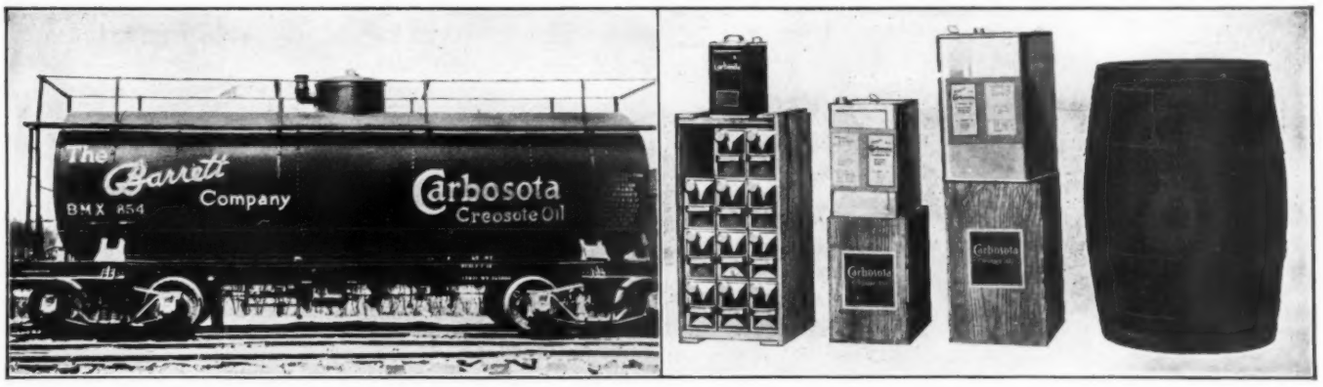
The use of the repeating coil type of service trunk, among other things, renders possible the employment of very simple connecting cord equipment on the toll switchboard. One of the simplest repeating coil types of toll service trunk is shown, in principle, in Fig. 238. In such a trunk circuit, the repeating coil, *H*, is installed in the local telephone office and two wires only are required per trunk circuit from the trunk multiple of the toll switchboard to the terminal rack of the local office.

The concentration of the trunk operating equipment at the local terminal simplifies the maintenance of the trunk, as trouble in the toll switchboard multiple is very unlikely to occur. When trouble of any sort does occur in the operating portion of the equipment, such as relays or lamps, it can very readily be remedied by the switchboard man in the local office.

(To be continued.)

Earnings of Denmark's Telephones

The earnings of the telephone and telegraph systems of Denmark, which are owned by the state, were approximately $1,800,000 for the year 1916. Of this sum the telephone system took in $625,000 and the telegraph system $625,000. Maintenance, salaries, etc., totaled $1,170,000, leaving a net profit to the state of about 18 per cent. on the capital invested.



Tank-car (10,000 gallons), 1-gallon can, 5-gallon can, 10-gallon can, 1 wooden barrel.
(Any quantity may be conveniently obtained)

Pure Coal-Tar Creosote Oil

has proved to be the *most efficient* of all wood-preservatives.

Carbosota Creosote Oil is simply that, refined and made physically fit for use in the Open-Tank Process and by the Brush Method.

Barrett's B Carbosota Grade-One Liquid Creosote Oil

Specify Carbosota—Don't Experiment. Carbosota conforms to a *standard* specification, which assures a pure, high-grade oil, refined to meet the physical requirements which are essential to the success of non-pressure treatments, combining highest toxicity practicable with low viscosity and permanence.

Briefly, Carbosota Creosote Oil meets the three chief requirements of non-pressure treatments to the fullest extent, namely:

Efficiency—It has proved to be the most effective protection against decay for structural wood. Coal-tar creosote has been used for nearly four score years in this country. Its consumption in the wood-preserving industry has reached more than 100,000,000 gallons annually, due exclusively to merit.

Economy—Carbosota Creosote Oil employed in the Open-Tank Process or by the Brush Method is economical and simple. The expense of treatment represents a proportionately small percentage of the cost of lumber.

Convenience—Carbosota Creosote Oil is obtainable in packages of convenient size throughout the country and is always uniform. Its physical characteristics permit its use under practically all conditions, as it remains liquid at temperatures below which work would not generally be carried on.

Thus wood-preservation is placed within the reach of the smallest as well as the larger consumers.

As the largest producers of Creosote Oil in the United States we are able to maintain a standard of service which cannot be equaled, and this is at the disposal of all who may be interested in wood-preservation. Detailed data and technical assistance may be obtained by addressing nearest office.

(Note: It is necessary that all wood to be treated by the Brush or Open-Tank Methods should be seasoned until air-dry.)

Booklet regarding the CARBOSOTA *treatment free on request*

The Barrett Company

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh
Detroit Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria

THE PATERSON MANUFACTURING COMPANY, Limited:
Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.

Practical Subjects — Discussions

I. C. C. Rules Governing Classification of Telephone Employes.

The Interstate Commerce Commission has just issued rules governing the classification of telephone employes and orders that all telephone companies within the scope of the act to regulate commerce be governed by these rules in the preparation and submission of their annual reports to the Interstate commission. The rules are effective as of July 1.

The word "employes" is defined in the set of rules as intending to include all persons in the service of the reporting telephone company subject to its continuing authority to supervise and direct the manner of rendition of their service, regardless of the fact that certain of such persons may be devoting part time only to the service of the company; may be employed for temporary periods; or may be absent temporarily on leave (e. g., vacation) or on account of disability due to accident or sickness.

It is intended to exclude persons engaged to render only specifically defined service and not subject to the continuing authority of the company to supervise and control their acts, such as independent contractors performing specific work or services for the company but not under its direct control and management; also persons who receive only a royalty or retainer from the company; pensioners not required to render service; persons absent on definitely granted leave without pay and not subject to call for duty; and persons temporarily laid off from service.

The number of employes being likely to fluctuate, telephone employes are likely to classify and count their employes at two different times each year; that is, at the ends of the months of June and December.

Each person concurrently engaged under a joint arrangement in the service of two or more telephone companies, shall be considered a joint employe and shall be counted by each telephone company involved in such a joint service arrangement and represented in its return of the number of employes by a fraction based on the number of telephone companies served. For example, if such an employe is in the service of three telephone companies, each such company shall report him under the number of employes as one-third of an employe. If, however, the entire compensation of such an employe is borne by a single telephone company, he shall, for the purpose of these returns, be treated as an employe of that company and not as a "joint" employe.

A person employed by and serving two or more telephone companies in the capacity of a general officer but acting independently for each company, shall be counted and reported as one employe by each company.

Employes should be classified with respect to the character of service rendered in accordance with the groupings shown in the accompanying table. Where an employe's duties are such as to make him includable in two or more classes he shall be counted under that classification indicated by the preponderating character of his work, and the return of his rate of compensation shall be assigned to the same classification.

Group No. Title	Class A companies	Class B companies	Class C companies
1.	General officers and assistants.	General officers and assistants.	Officers and operating heads.
2.	Operating officials and assistants.	Operating officials and assistants.	
3.	Attorneys and right-of-way agents.	Attorneys and right-of-way agents.	Attorneys, engineers and accountants.
4.	Engineers.	Engineers, draftsmen, surveyors, and student engineers.	
5.	Draftsmen, surveyors and student engineers.		
6.	Accountants.	Accountants.	
7.	Clerical employes.	Clerical employes.	Clerical employes.
8.	Local managers.	Local managers.	Local managers and commercial agents.
9.	Commercial agents.	Commercial agents.	
10.	Experienced switchboard operators.	Experienced switchboard operators.	Operators and service inspectors.
11.	Operators in training.	Operators in training.	
12.	Service inspectors.	Service inspectors.	
13.	Supervising foremen.		
14.	Central office installation and maintenance men.		
15.	Line and station construction, installation, and maintenance men.	Plant construction and maintenance men.	Plant construction and maintenance men.
16.	Cable and conduit construction and maintenance men.		
17.	All other employes.	All other employes.	All other employes.

Groupings of Classes of Employes of Telephone Companies.

Shadows and Sunshine Along the Telephone Trail.

By Well Clay.

The road that leads to our labors
Is a pleasant road to tread,
In the early morn when the day's new born,
To toil for our daily bread.

But the homeward road at evening,
When the west has swallowed the sun,
To our place of rest, we love the best,
When the work of the day is done.

Things generally look better in the morning after one has had a good night's rest and a good breakfast than they do at the end of a day when one has had to labor with both body and mind. This is especially so on the days when things seem to go wrong, or, at the best, very slowly. Who was it that had this in mind when he composed the words of that famous verse: "It's easy enough to be pleasant when things move along with a vim but the guy worth while is the one who'll smile as he comes into town on the rim"?

Sometimes the bookkeeper who worked late the night before on books which refuse to balance, finds his error in the morning with very little trouble and feels irritated to think that he did not discover it the night before. The trouble seems to be that the mind gets out of focus, as it were, and refuses to see things in the right light, when it has been overworked. As a matter of fact, the mind does not focus the same at all hours of the day and night, whether we are using it to excess or not.

Like the difference between a dismal rainy night in the chilly weather and a dew-dripping morning in May, when the sun is shining and all nature at its best, is the range of moods of the individual. All the difference there is, according to the medical sharks, is the difference in the amount of poisonous matter, called toxins, which is present in the blood.

The manager who expects to see things always in the same light is going to be disappointed, for there are bound to come days and weeks when things seem to be entirely different than they looked to him at the outset. His rosy dreams take on a less pleasing hue when he gets his vision in that state of focus where it shows how far short of the distance which he expects his dollar-a-month to go that it really is going to accomplish. His ideas

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of how he will push things when he returns from a state convention do not materialize on those hot days of the summer when no one seems to care and when the finances seem to be at a low ebb.

His collections seem to be easy to keep up to the mark, if he will adopt some of the good ideas on the subject which he hears at the convention, from more successful managers. But when it comes down to the actual compelling of old friends, who are perfectly good financially, to pay their rentals in advance, when they have been used to do it once a year in arrears, why things look different again. A 100 per cent. collection record does not then look to be such a valuable asset after all—neither does it seem to be as necessary as the experts told him at the convention.

His vision in this respect has changed focus, that is all. The poison of indifference, disinclination to offend friends, and general inertia, has gotten into his blood and the poison has changed the focus of his managerial sight.

The manager sees some new-fangled invention at the convention and deems it a very desirable thing to have it to use in his work. He buys it at a high price, only to find when he gets home that it is not adapted to his particular field of endeavor or else he is not sufficiently educated in his profession as to be able to make good use of it. It is cast aside to form a part of the dead load hanging over his plant on which he must forever pay interest, or dividends, which are the same. His focus at the convention was all wrong.

He determines at the convention, perhaps, to go back to his old home town and go after those farmers who plant trees under his lines and give them notice to get those trees out or suffer the consequences. But when he gets home and right up close to the proposition, he finds it is better to temporize and try to get around the question in another fashion. The result is that things slide along as before and no particularly startling changes are made at all. His focus has been changed by a combination of nearness to the obstacle and his natural disinclination to stir up the animals when they are resting quietly, even though they are occupying space which he is desirous of having for his own use.

He buys a lot of goods, which he does not particularly need for a while, just because the salesman is a good fellow, and the fact that he gets 60 or 90 days to pay for them. He has not the money in hand but thinks that by that time he will have plenty. At least, he always has been able to pay for his goods in the past, so why worry about the future.

When the time comes around, he begins to wish he had not bought the goods and the amount of money which he must pay looms up in his mind as a much larger sum than it did when he so airily told the salesman to "shoot 'em along." He also discovers that the man who writes the letters, demanding payment on time, is apparently not in close communion with the man who told him that it would be all right if he didn't pay just on the dot. He is amazed at the letter he gets from the credit man and is incensed at his rather arbitrary demands.

His focus is changed. It is safe to say that he will be wiser next time and not so willing to believe that the house will be as benevolent as stated. He begins to doubt that the salesman knows the other man at all. If, for instance, the credit man and the salesman should change places for a week or so, it would be safe to say that both would also experience a change of the focus at which their minds are normally set. Their pet theories about how the other man should conduct his operations would undergo considerable modification. If they, in turn, could change places with the manager, there would be a further and more considerable change. Perhaps it would do all three good to rotate their employment for a while until they had a taste of all three, to see if the result would not be beneficial.

A change of focus is a good thing, or else the human eye would have been made with a fixed lens. A change of angle, when one is looking at a proposition, sometimes changes the aspect of the whole thing affecting decisions which make a world of difference. The tightening of a small screw at an opportune moment changed the whole course of the telephone business and in fact guaranteed its development. How much more important a real manager is than an inert, lifeless screw. How much more opportunity there should be, and is, to accomplish something worth while if he can get his mind focused right, we will say, three times out of five, on the important things which affect the business.

These important things are not the things which were uppermost and visible in your mind when you started in the busines but maybe such little things as finances, depreciation, co-operation with the craft, diplomacy with your subscribers, the development of a courteous office force and a pleasantly efficient corps of operators.

It may mean office systems, or it may mean the proper selection of the right-sized territory in which to operate. It may mean a thousand things which you never thought of when you began. That is the reason why the good Lord provided you with a focus, which is capable of constant changes, in order that you may adapt yourself to the multitude of new problems which are constantly intruding themselves in the picture of life and affecting our actions by the aspects they present.

The best use of all which we can make of this wonderful faculty, would be to go as far as we can towards realizing the earnestly expressed wish of our good old friend Bobbie Burns.

APHORISM: Change your direction and you change your outlook.

Report of Standardization Committee of Kansas Association.

The standardization committee of the Kansas Independent Telephone Association, appointed at the convention last December, has completed its investigations relative to the standardization of construction material and pole line hardware. As a result it has issued in pamphlet form its report which, for the most part, is merely a recommendation as to what sizes and styles of materials are most suitable for Independent construction and why.

For the reader's convenience and to permit of proper discussion under each general heading the report has not been arranged in alphabetical order but by subjects. Thus all related materials and those likely to be needed for a certain piece of work are found grouped together, as, for example, the listing of machine bolts, carriage bolts, cross arm braces and lag screws under the general heading of "pole line hardware."

Such subjects and materials are discussed as poles, treatment of poles, arms, pins and brackets; batteries and battery material; hot galvanized pole line hardware; underground cable in small plants, etc.

The Kansas association is the first to compile a comprehensive report of this kind and the large number of requests for copies which have been received from officials of other associations shows the widespread interest in the matter of standardization and its importance in the future of the Independent industry.

Call Recorder in Australia.

An automatic recorder of effective telephone calls, invented by an Australian railway employe named Godfree, has been in use about 18 months at the Ballarat telephone exchange on trial, with a view to obviating the frequent complaints of overcharging. Mr. Halion, the officer in charge of the exchange, has reported that the device is giving complete satisfaction.

Send Your Interesting Photographs to "Telephony."

If you have any photographs showing construction work, motor trucks or trailers, good pole line views, or underground construction scenes, kindly forward them to the editorial department of "Telephony."

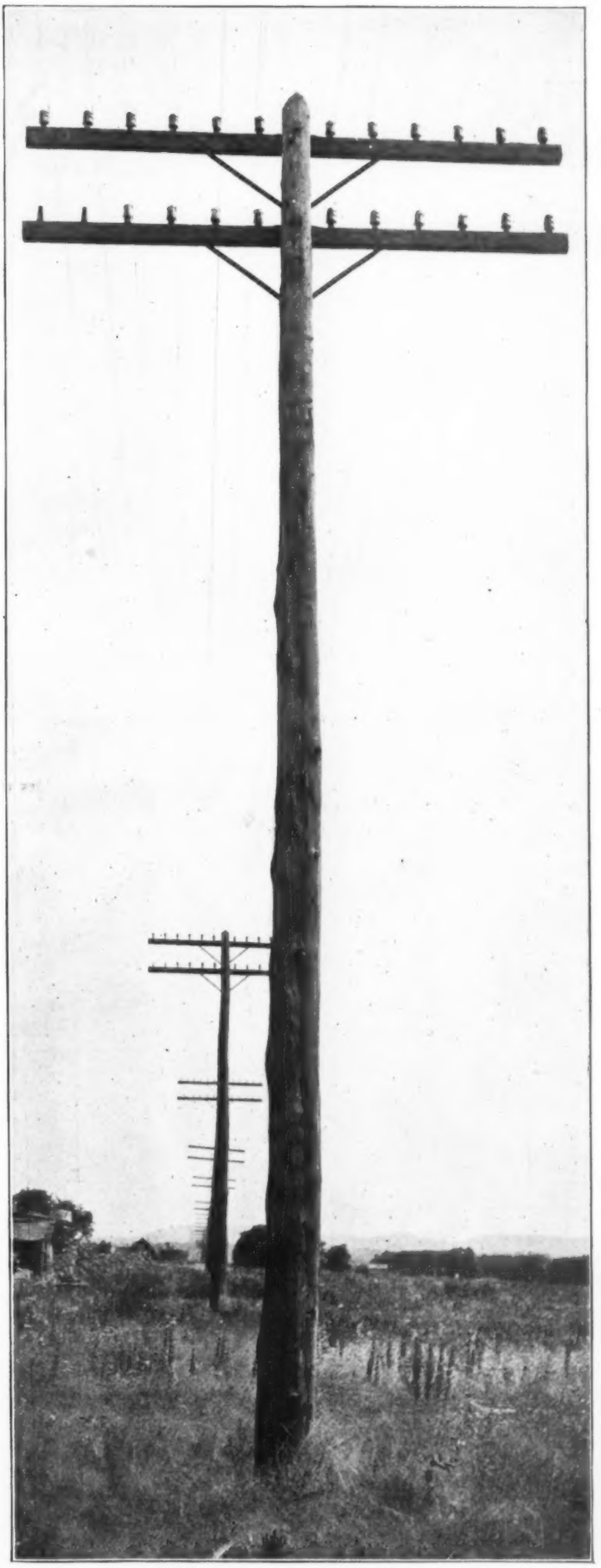
A Fine Example of Independent Line Construction—Line Supplies Bought of Kellogg.

We have large stocks constantly moving and on hand of standard materials. Do you need hardware, wire, insulators, brackets, pins, arms, poles?

We have a special separate supply organization managed by practical men whose constant effort is to give you intelligent prompt service on inquiries, orders and shipments.

Write for our Line Supply bulletin and illustrated, concise, up-to-date net price list just out.

Send us a trial order today—lowest prices.



KELLOGG SWITCHBOARD & SUPPLY COMPANY

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The Only Exclusive Telephone Supply House

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Convention: Indiana, Indianapolis, September 19-20

Miami Trailer Co. Enlarges Quarters in Troy, Ohio.

Ground was broken recently for a 60 by 65 ft. addition to the plant of the Miami Trailer Co., located on East Main street, Troy, Ohio. The new building will be of frame construction and two stories in height.

In the addition will be located the machine room, the woodwork department and the assembling department. Such has been the success of the company, which was organized only two years ago, but the business quickly outgrew the factory building and it was necessary to enlarge the plant.

New Stromberg-Carlson Switchboard Generator.

The accompanying illustration shows the design and appearance of a new switchboard generator manufactured by the Stromberg-Carlson Telephone Mfg. Co. of Rochester, N. Y., for use in rural switchboards which terminate long and heavily loaded lines subject to unusually severe ringing conditions.

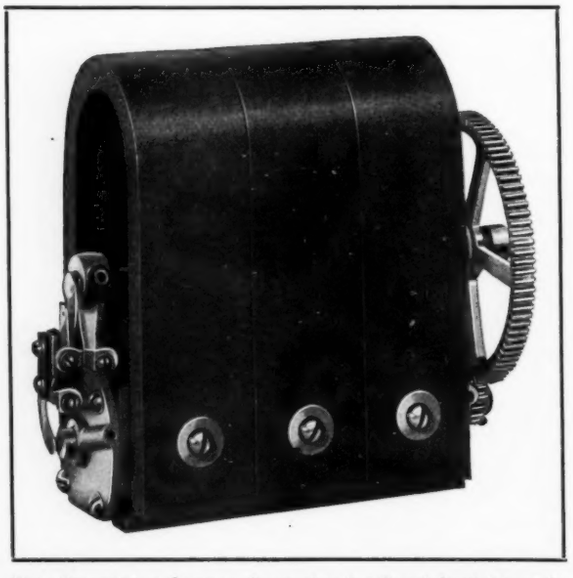
Tests made in the company's laboratory, based upon output and the actual number of bells operated satisfactorily are said to indicate that this type of switchboard generator is capable of delivering an output at least 38 per cent. greater than any other five-bar type hand generator, including the Stromberg-Carlson company's own make.

The high efficiency and large output of this generator is largely due to the intensity of the magnetic field in which the armature revolves. This field is established and maintained by three large size permanent magnets similar to those used in automobiles for ignition purposes. The steel from which the magnets are made is a special alloy, which possesses exceptionally fine magnetic qualities and retentivity so that the generator shows no appreciable loss of power throughout its useful life.

The armature core, as in other types of Stromberg-Carlson hand generators, is built up of laminated stampings to void eddy current losses in this part of the apparatus. The armature is wound with silk insulated copper wire and is impregnated with a moisture-proof insulating compound after winding to prevent breakdowns in service due to excessive moisture.

This new generator is now known as "No. 63" and may be used in all makes of switchboards with equal success. It is interchangeable in Stromberg-Carlson switchboards with the generators now in use, as it mounts upon the same cabinet drillings.

Further information regarding this generator will be supplied upon request, by any Stromberg-Carlson salesman or by application to the company's offices at Rochester, N. Y.



New Stromberg-Carlson Generator for Rural Switchboards.

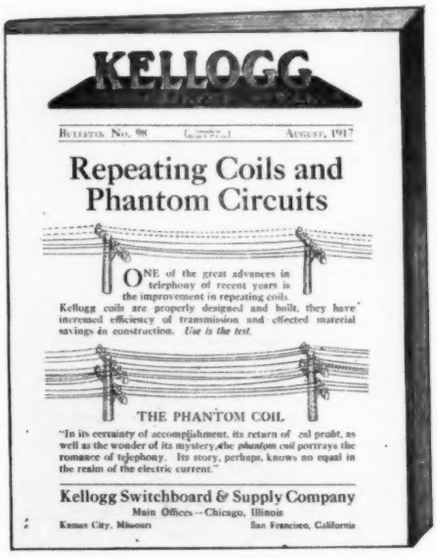
Revised Edition of Kellogg Booklet on Repeating Coils.

"In its certainty of accomplishment, its return of real profit, as well as the wonder of its mystery, the phantom coil portrays the romance of telephony. Its story, perhaps, knows no equal in the realm of the electric current."

These lines appeared in a recent issue of the Kellogg house organ with other descriptive matter and illustrations relative to the Kellogg repeating coils and phantom circuits.

The Kellogg Switchboard & Supply Co. has recently issued a revised edition of its bulletin on repeating coils, the cover of which is reproduced in the accompanying illustration. A great many Kellogg customers have continuously used Kellogg coils for years and know their value in actual practice and comparisons of line construction costs, with and without the Kellogg phantom coils.

In addition to the half-tone photograph reproductions of two of the most popular Kellogg coils, there are reproduced in this booklet the actual coil diagrams and coil connections with drawn circuits, showing exactly what the installation should be under the various conditions commonly met with in


KELLOGG
Bulletin No. 98
August, 1917
Repeating Coils and Phantom Circuits
ONE of the great advances in telephony of recent years is the improvement in repeating coils. Kellogg coils are properly designed and built, they have increased efficiency of transmission and effected material savings in construction. Use is the test.
THE PHANTOM COIL
"In its certainty of accomplishment, its return of real profit, as well as the wonder of its mystery, the phantom coil portrays the romance of telephony. Its story, perhaps, knows no equal in the realm of the electric current."
Kellogg Switchboard & Supply Company
Main Offices—Chicago, Illinois
Kansas City, Missouri
San Francisco, California

Cover of Booklet on Repeating Coils.

various types of exchange service. This bulletin also contains chapters on phantom circuits and how to obtain phantom circuits on line conditions and line transpositions. The latter subject is taken up at some length, and satisfactory types of transposition brackets are discussed and illustrated. The chapter on phantom combinations includes complete illustrations of all practical working conditions. This book, copies of which may be obtained upon request, will be found of interest and value to all practical telephone men.

Conserving Motor Truck Power by the Use of Trailers.

A motor truck cannot carry much over its rated capacity, because it is built only to carry that weight—its springs are designed to carry that weight—its axles, as well as all its construction, are designed to carry that weight. But its motor has excess power to pull, under average conditions, as much again (and sometimes twice as much) as it can carry; and carry its full load at the same time.

In this day of conservation, telephone companies are utilizing this excess of power and solving their haulage problems by investing in motor truck trailers. Thus the capacity of their trucks is doubled, with a small increase in cost.

Motor truck trailers are made by the Troy Wagon Works Co., of Troy, Ohio, in capacities of one to five tons, and in types that are particularly adapted for

Trouble Detectives!

PIGNOLET Portable Testing Meters will locate any kind of trouble besides measuring volts and amperes; will also determine resistance of coils, lines, ringers, etc.

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No "cleaning out of obstructions"

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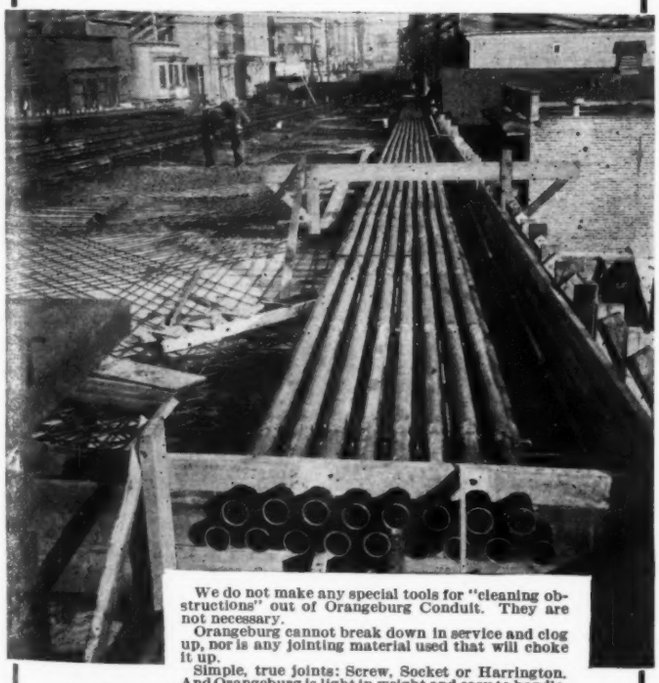
FIBRE CONDUIT



We do not make any special tools for "cleaning obstructions" out of Orangeburg Conduit. They are not necessary.
Orangeburg cannot break down in service and clog up, nor is any jointing material used that will choke it up.
Simple, true joints: Screw, Socket or Harrington.
And Orangeburg is light in weight and easy to handle.
Costs less to lay and LESS TO BUY. This permanent conduit is certainly worth investigating. Write for Book H.

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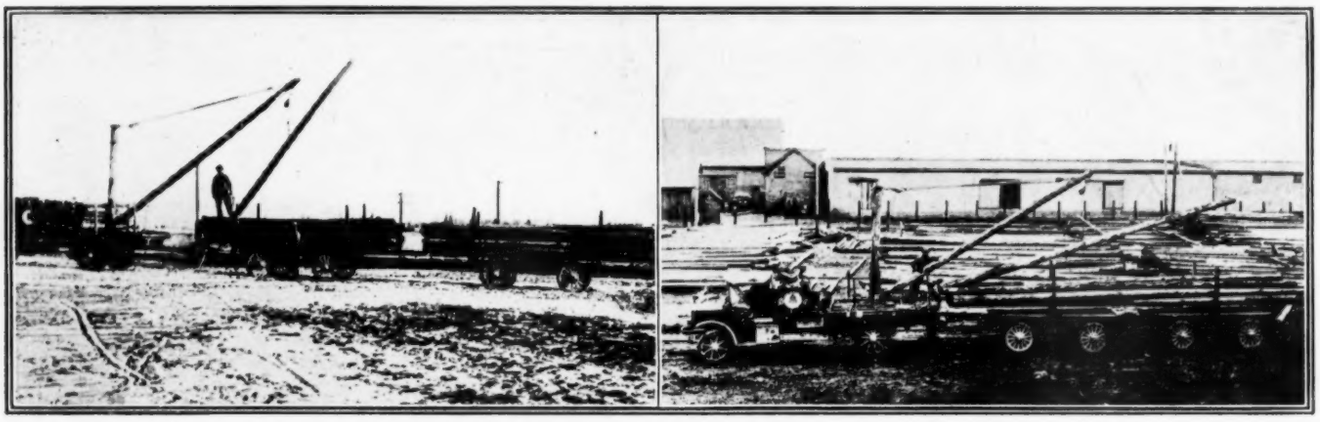


Long Poles Are Easily Handled by Means of a Train of Trailers.

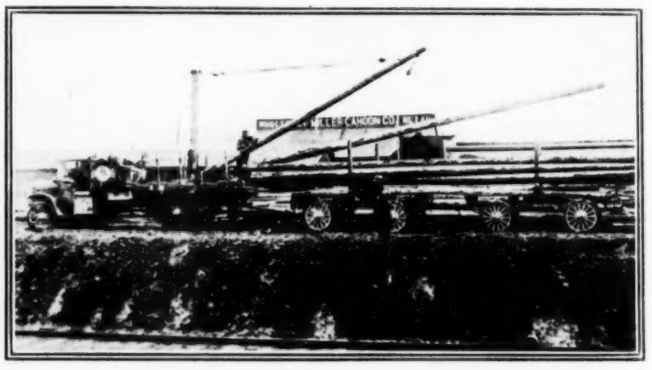
telephone work. They are built for use as a single trailer or in trailer trains. They are reversible and therefore can be backed up to any loading platform, or backward into any alley, as easily as if they were being moved forward. The truck can be coupled to either end of the trailer, thus providing great flexibility.

The Troy trailer is built entirely of bronze and steel, with wood only in the wheels. It is equipped with drop forge axles of solid manganese, high-grade roller bearings, artillery wheels and solid rubber tires. The bushings are made of bronze. All movable parts are provided with compression grease cups, and are said to be self-sustaining in every way.

All bearings with the exception of the wheel bearings have steel sleeves on bolts which take the wear instead of the bolts. These sleeves are clamped tight and do not revolve on the bolts. The wheels, axles, spindles, bronzes, shackles, bolts and springs are said to be made in strict accordance with the approved practice of the Society of Automobile Engineers.

The strongest arguments in favor of the adoption of the trailer as an auxiliary to the motor truck are: First, increased carrying capacity and, second, reduced hauling costs.

Economy and efficiency in truck-trailer operation are insured if due consideration be given the character of the material to be hauled in its relation to the trailer equipment, loading methods, etc.



Engine of Truck Is Used for Loading Poles.

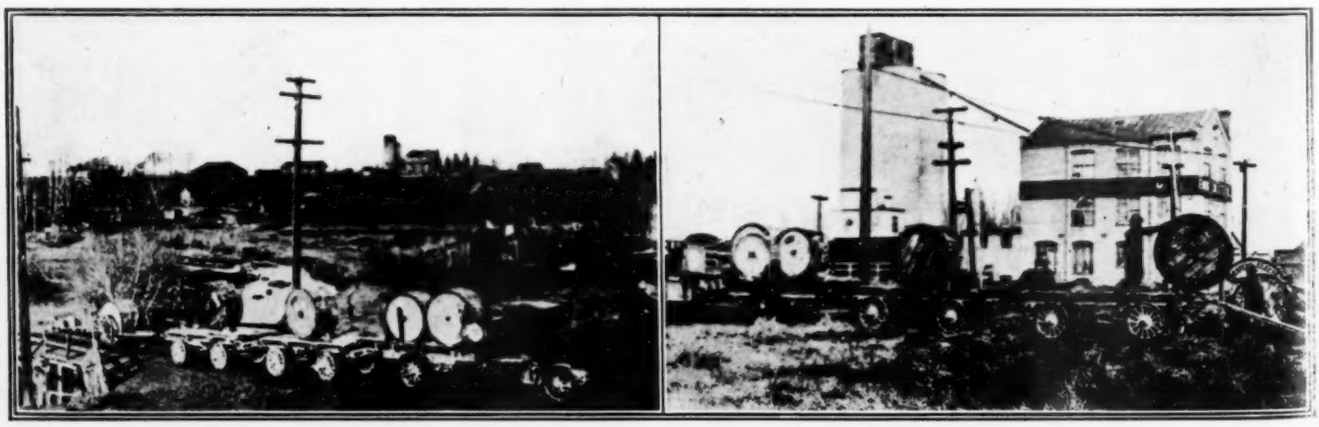
On long hauls, the lowest hauling costs are obtained where the tonnage moved per trip is greatest. In such cases the additional hauling capacity afforded by the use of the trailer assumes prime importance. If the truck hauls three tons working alone when with trailer equipment it might just as well haul six or more tons at a very slight additional operating expense, the value of the trailer is apparent.

The question of speed is also an important factor in long hauls. The Troy trailer is built to run just as fast as the truck can pull it. A low-speed trailer, by limiting the speed of the truck, nullifies the advantage to be gained by carrying the double load. If, however, it is impossible to operate the truck at its normal speed in districts where the traffic is congested, the use of the trailer will offset the loss occasioned by the reduced speed.

Where the hauls are short, the item of lost time—the time spent in loading and unloading—assumes first importance. It is imperative, therefore, that this lost time be reduced to the minimum. The truck, to be a profitable investment, must be kept moving. This may be accomplished by the use of one or more Troy trailers. Extra trailers may be quickly put in or taken out of service, and when not in use represent a smaller investment than the same carrying capacity in motor trucks.

The Troy trailer is being used to advantage by a number of telephone companies.

Descriptive literature and detailed information relative to its trailers will be sent upon application to the Troy Wagon Works Co., Troy, Ohio.



Hauling Telephone Cable by Means of Trailer Attached to Motor Truck.